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CONTENTS

	PAGE
Editorial Notes	349
Check Point after Half-a-Century	351
Fuel Problems	351
Unhelpful Report on Canadian Railway Wages...	352
North Eastern Region Winter Timetable ...	352
Indian Railway Testing and Research in 1958-9	353
American Railway Retrogression	353
Letters to the Editor	354
The Scrap Heap	355
Overseas Railway Affairs	356
Diesel Turbine Locomotives	358
Transporting Out-of-Gauge Motive Power ...	360
Driverless Platform Trucks	363
Electric Traction Section	365
Personal	371
New Equipment and Processes	374
News Articles	376
Contracts and Tenders	377
Notes and News	378
Railway Stock Market and Official Notes ...	380

Hopes of Peace on the Railways

AGREEMENT earlier this year on implementation of the recommendations of the Guillebaud Committee on railway wages and conditions gives reason to hope that the coming winter will see no further series of wage demands from the three railway unions representing the generality of railway staff: the National Union of Railwaymen, the Associated Society of Locomotive Engineers & Firemen, and the Transport Salaried Staffs' Association. Claims from these unions have been made with dismal monotony towards the end of previous years, and every winter has seen their rejection—inevitable in view of the financial position of the nationalised transport undertaking—with consequent disputes, threats of strikes, and varying degrees of concession by the British Transport Commission. Implementation of the Guillebaud recommendations has placed the railways in a financial position which may result in serious consequences to the staff. The unions must realise that their members would be the first to suffer if the Government were to decide to make drastic reductions in the activities of a railway system which it decided could not be made to pay its way. This is over and above the process which has been continuing for some time, of reducing the total of railway staff through rationalisation and natural wastage. These hard facts do not seem to be appreciated by the N.U.R. and the Confederation of Shipbuilding & Engineering Unions as regards the claim for railway workshop staff. As we went to press, negotiations were in progress between the Commission and these unions on the Commission offer to increase the rates of workshop staff by a further 3 per cent from January 11, 1960. The unions wish the increase to be paid from January 4, which was the date from which increases were granted to staff covered by the Guillebaud Inquiry, which did not cover shopmen. They are dissatisfied moreover with the amount of the offer, and claim that as regards craftsmen the proposed rates compare unfavourably with those paid in outside industry. There has been irresponsible talk of strike action if the demands were not met, but there were hopes that agreement would be reached at the meeting to be held on Wednesday between the Unions and Sir Brian Robertson, Chairman of the Commission.

Incentive Bonus for Busmen

THE scheme for an incentive bonus for London Transport bus drivers and conductors proposed by London Transport Executive and outlined on page 376, is a constructive contribution towards the solution of the problem of bus crew shortages. It should attract new, and retain existing, staff, and increase efficiency and revenue without adding greatly to wage costs. The Executive has been patient and accommodating in its readiness to meet the wishes of the Transport & General Workers' Union in making changes in matters such as allowances for overtime and early and late working. The acute shortage of conductors and drivers on some L.T.E. bus routes is a serious inconvenience to the travelling public in causing gaps in the service, and the irregularity in services causes some hardship to busmen. The financial situation of the British Transport Commission does not allow of any major wage increase. The busmen will be very unwise if they refuse a helpful offer.

Mr. Alexander Eddy

FEW legal advisers of railway undertakings combined knowledge of railway law with an attractive and likeable personality and warm human sympathies to the extent achieved by Mr. Alexander Eddy, whose death is recorded in our personal columns. His legal knowledge was greatest, perhaps, in the rating of railway hereditaments, but he was a successful adviser on the wide variety of legal matters affecting railway undertakings. He was solicitor to the London & North Western Railway Company and, after grouping in 1923, to the London Midland & Scottish Railway Company, and eventually became its Chief Legal Adviser in succession to Mr. H. L. Thornhill. He was concerned, in his L.N.W.R. days, with some of the preliminaries to grouping, and, in the service of the L.M.S.R., with the rating cases before the House of Lords before the war of 1939-45. His personal qualities included the power to delegate, and a warm interest in his fellow men. He was one of a railway family: his father was Assistant General Manager of the Caledonian Railway and, subsequently, Chief Commissioner of Railways in New South Wales, and his brother, Sir Montague Eddy, became Chairman and General Manager of the Buenos Ayres Great Southern and Buenos Ayres Western Railways. His stepbrother, Mr. Cumberland Lowndes, was for many years an officer of the L.N.W.R.

Britain's Thriving Tourist Industry

ABOLITION of "outmoded passport and other inhospitable frontier controls" is urged by the British Travel & Holidays Association in its report for 1959. This wish is shared by all responsible for the smooth functioning of our seaports, where the large numbers conveyed in individual ships and trains can be much delayed by immigration and other formalities at peak traffic periods; these controls, moreover, whether they do or do not cause delays, are inhospitable, and can create an unfortunate impression on visitors. The lucrative nature of tourist traffic should encourage the authorities to reduce Customs examinations. More than £220 million in foreign currency was earned for this country

last year from tourism. This sum, which represented an increase of 11 per cent on the 1958 earnings, included fare payments to British shipping and air undertakings. The number of visitors was some 1,400,000, or 11 per cent more than in 1958. A great deal was done by British Railways and associated transport undertakings to create this traffic, not least by providing comfortable ships specially designed for individual services across the Channel and North Sea. As to the B.T.H.A. stress on the need for more and better hotel accommodation, it must be remembered that the British Transport Commission renders good services to the travelling public by maintaining good hotels—often the best in the neighbourhood—in London and many provincial towns.

Overseas Railway Traffics

NET railway earnings of the West of India Portuguese Guaranteed Railway Co. Ltd. for the 11-day period ending August 31, 1960, amounted to contos 713, an increase of contos 61 compared with the corresponding period of 1959. Receipts in general have shown a steady improvement since the commencement of the year and at August 30, the aggregate amounted to contos 12,284, an increase of contos 2,642 compared with the corresponding period of the previous year. Paraguay Central Railway receipts continue to decline. Receipts for the week ended August 26 amounted to G1,416,809 a decrease of G.418,158 compared with the corresponding period of 1959. Aggregate receipts from July 1, 1960, amounted to G12,657,527 (G15,345,793). Costa Rica Railway receipts for July amounted to colones 2,524,839 compared with colones 2,467,482 in July, 1959, an increase of colones 57,357. Aggregate receipts from July 1 amounted to colones 2,524,839 (colones 2,467,482). Figures received from the Midland Railway Co. of Western Australia Ltd. show that estimated road and railway receipts for June amounted to £A79,883 compared with £A66,059 in June, 1959.

World Bank Loan for Colombian Railways

COMPLETION of the Atlantic Railway, which will connect Colombian ports on the Caribbean with the central zone and the Pacific, is a principal object of the World Bank loan of $5,400,000 to the Colombian National Railways, approved earlier this week. The loan will also finance purchase of 16 diesel locomotives, about 300 goods wagons, spare parts for passenger coaches, and workshop equipment. The total cost of these is estimated at about $6 million, and the balance of some $600,000 will be met by the Colombian Government. The loan is for 15 years and bears interest of 5¾ per cent per annum. Amortisation will begin in May, 1962. The loan is guaranteed by the Republic of Colombia. The extent to which the loan is associated with purchase of locomotives and other equipment in specified countries is not yet known. In accordance with the policy of standardising the gauge in Colombia at 3 ft.—that of most of the mileage of the former privately-owned lines—the Atlantic Railway is being constructed on that gauge.

Visit of Chilean Civil Engineer

INSIGHT into British practice in a wide variety of railway activities is afforded railway officers from overseas by the United Kingdom Railway Advisory Service. The main interest as regards British Railways, of Señor Carlos Düring, District Engineer, Valparaiso, Chilean State Railways, whose visit to Europe comprises Germany, France, the United Kingdom, Austria, and Italy, is long-welded rails. In Britain he has also inspected a track-laying machine in action at Maidenhead, Western Region; the works of Dorman Long & Co. Ltd., at Darlington; the Castleton Road (Manchester) Rail Welding Depot, and long-welded rail, in the track near Warrington, London Midland Region; the Elliott track recording coach on British Railways; track tamping machines in operation at Marylebone; manufacture of rail inspection cars by D. Wickham & Co. Ltd., Ware; and research work on the stability of long-welded rails at the Western Region civil engineering laboratories, Paddington. He was able to sample the riding qualities of newly-built rolling stock on British main-line track on a trip to Leicester in the "Midland Pullman". He was entertained to dinner by the Chief Civil Engineers of British Railways at the Euston Hotel, and at a cocktail party given by U.K.R.A.S. at the Charing Cross Hotel, when the company included representatives of the Government and the British Transport Commission and British Railways civil engineering staff and of manufacturers of permanent way material and track maintenance equipment, and of motive power and rolling stock.

More Modernisation at Stratford Depot

PROGRESS with conversion for diesel operation of the motive power depot at Stratford, British Railways, Eastern Region, reached a further important stage recently with the completion of a 300-ft. long shed for running and maintenance work on diesel locomotives exclusively. This is the first depot in the Eastern Region with centralised workshops, stores, offices, and staff amenities and its capacity is sufficient for 16 main-line locomotives under cover. It is situated on part of the site formerly occupied by the Jubilee steam shed. Also it is close to the building described in our December 5, 1958, issue, erected primarily for dealing with diesel multiple-unit stock, and in which one of the three maintenance tracks was reserved as a temporary measure for work on locomotives. In the new shed there are four bays at each end of a two-storey workshop and administrative building. The use of dead-end tracks has the advantage that once a locomotive is in the shed there is not usually any need to move it until maintenance has been completed. Non-productive work is kept to a minimum by having the centralised stores within a minute's walk of any locomotive.

Driverless Trucks for Depot Working

FLEXIBILITY in depot working, absence of tracks and conveyors which impede movement of vehicles and staff, and saving in the time of staff are among the advantages claimed for the system of driverless platform trucks for depots described on pages 363 and 364. The Robotug system of electronically-controlled trucks, or tugs, is reported to be giving good service at Herbert Street Goods Depot, Wolverhampton, in the Western Region, British Railways, where it has been installed after experience with a preliminary application at Newton Abbot. The most notable feature is the guidance of the tug along a selected route by a wire laid ½ in. below the platform surface. Each of these routes is divided into sections, and block working resembles that on a railway; re-starting is automatic as the section is cleared. The turning circle of tugs and trolleys is only 12 ft. 6 in., so that the installation is suitable for narrow platforms. Coupling is automatic, and danger to staff is nil because there are no gaps between trolleys.

Increased Traffics in Malaya

AFTER a prosperous first quarter, during which railway revenue at $17·3 million compared with $14·7 million for January to March of 1959, Malayan Railway receipts continue to exceed the corresponding totals for last year, despite decreases in certain traffics. For the second quarter of the current year receipts are estimated at $17 million, against $14·5 million last year. A drop in passenger revenue is attributed by the management mainly to reduced movement of the armed forces and police because of the end of the state of emergency. Goods tonnage continued well in excess of last year's totals. The railway nevertheless is subject to sudden fluctuations in traffic, the result largely of changes in the levels of world trade which may cause sudden declines in the prices of two basic Malayan products, tin and rubber, and consequent widespread depression in the national economy.

Faster Passenger Services

TO combat road competition, and more particularly private motoring, the Malayan Railway management is reported to be considering fast diesel services between Singapore, Kuala Lumpur, and Prai (for Penang). A high standard of comfort and catering would be offered. These services presumably would be intended for upper class passengers, and special train or railcar sets would be built for them. Placing in service of Australian-built Budd railcars has made possible the replacement of certain steam trains by diesel railcars. The

main-line night services between Kuala Lumpur and Singapore have been re-timed, with resultant improvement in punctuality. In accordance with the policy of withdrawing uneconomic facilities several stations were closed earlier this year, and passenger services were withdrawn from the Batu Arong branch. More goods trains are being run to move additional traffic, including cement, and to reduce wagon turn-round. Import and export traffic through, and revenue from, Port Swettenham, which is owned and managed by the railway, increased during the first six months of 1960, when estimated revenue was $5·6 million, compared with $4·4 million for January to June of last year.

4,000-h.p. Diesels

THOUGH twin-unit diesel locomotives of 4,000 b.h.p. or more were running in France as long ago as 1938, no single-unit machine of that output has yet seen the light. However, no fewer than six six-axle locomotives of this output are now under construction at the Krauss Maffei works in Munich, and are notable for several reasons apart from being single-unit locomotives. In the first place they are for U.S.A. Class I railroads, and so represent a startling innovation—American top-line railroads importing top-line motive power. Again, these locomotives are diesel-hydraulic, and so are a complete break in U.S.A. technical practice. Moreover, the three for the Denver, Rio Grande & Western are to operate over 1 in 62 and even 1 in 33 gradients, and at an altitude of 7,000 to 10,000 ft. above sea level; the three for the Southern Pacific are to operate over more level lines at lower altitudes. These locomotives are to have Maybach 1,500-r.p.m. light-weight charge-air cooled engines, and so introduce the quick-running engine into U.S.A. main-line traction. Finally, the Voith hydraulic transmission is to incorporate dynamic braking, and so will give one of the most boosted features of American diesel-electric locomotives.

Check Point After Half-a-Century

CONTRIBUTIONS which the locomotive engineer is able to make towards the community include the devising of improvements to rail transport for people of all nations including the work of making it more economical, more reliable, and more suited to their convenience than ever before. To foster the interest that makes possible the necessary advancement of the science and practice of locomotive engineering by discussion, enquiry, research, and experiment is, in effect, the purpose of the Institution of Locomotive Engineers. In support of this theme, expressed during his Presidential address to the Institution at a meeting in London earlier this week, Mr. D. C. Brown, Chief Mechanical Engineer, Crown Agents for Oversea Governments & Administrations, ably summarised many of the more recent developments on the railways overseas for which that organisation has acted on matters such as purchasing, inspection, and international standardisation.

As Mr. Brown's year of office as President marks the 50th anniversary of the Institution, his opening remarks were devoted to tracing the important events in railway history since the first meeting on February 4, 1911. That year more or less coincided with the commencement of an age of new possibilities in power and performance for the steam locomotive so that the span of 50 years had seen its zenith and its eclipse. Steam was doomed some 25 years ago as new forms of motive power developed in application and reliability to meet competition from road transport. Despite the marked technical advantages of electrical and diesel power and despite also the ministrations of design panels and publicity experts, he thought that neither of the relatively new forms of traction had yet become the object of veneration by the professional engineer or gained any of the affection felt by enthusiastic and knowledgeable amateurs for the steam locomotive.

Even in 1911 the position of Britain in the export market for locomotives and rolling stock was suffering competition from Germany and other countries. That competition had become increasingly severe; moreover, the demand had contracted. Nations which once had been large buyers were themselves becoming manufacturers and even exporters. Mr. Brown believed that, as a result of the British being late to adopt the diesel locomotive for main-line work, this too had affected exports, as manufacturers here had been denied some of the opportunities enjoyed by their rivals whose products were strengthened by the demands and service experience of the home railways.

Rig testing and trial running, he stressed, were essential and rewarding but they were no substitute for the gruelling test of day-to-day running under actual service conditions. In consequence, much of the development work with new types had to be done on site under difficulties and at great expense, but this had the notable result that such locomotives, from their inception, had been designed to meet the special and exacting requirements of oversea service. Some of this experience had been fed back into types running on British Railways which in turn were providing service experience based on a much greater running mileage than could be attempted by any except the largest oversea railway administrations. This would be of immense advantage to all of those in this country whose interests lay with oversea railways.

When technical difficulties arose at site, perhaps with some new feature of a well-established locomotive design, a questionnaire for much-needed additional information might have an effect which was not always appreciated on an oversea supervisor harassed by the day-to-day business of running a railway. A personal visit, though costly, usually had advantages in the establishment of good relations and the building up of background information which extended far beyond the primary purpose. Recently there had been delay from time-to-time in obtaining the delivery of some items of spares for steam locomotives partly because of difficulty in obtaining, in the comparatively small quantities required, the types of steel traditionally used, or even suitable alternative steels. The attention of the industry had been drawn to this problem before it reached serious proportions; it was a point which needed to be watched because of the life expected from some of the steam locomotives still in service.

The 50th anniversary of the Institution had fallen at the end of one of those natural chapters in human affairs. It coincided with great political changes overseas, and, in the United Kingdom, it marked the coming into effective operation of the modernisation plan of British Railways; it also coincided with the conference on electrification. Mr. Brown regards the year 1960 as a natural check point at which to pause and survey the present in the light of past experience, and also to assess the future with its difficulties, its uncertainties, but as always, its immense possibilities.

Better Results in Denmark

A WORKING surplus, the first for many years, was attained by the Danish State Railways during the year ended March 31, 1960. It amounted to only 700,000 kroner. Receipts for 1959–60 are debited, through a change in the method of accounting, with staff holiday payments in respect of two years; this was not done in the case of the preceding 12 months. The additional charge is 6·8 million kroner against 1959–60, so that the results of working for that year are some 30 million kroner better than for 1958–59, which ended with a deficit of 22·5 million kroner.

Principal results for 1958–59 and 1959–60 are given below:

	1958-59	1959-60
Miles open	1,740	1,720
Passengers (millions)	113·1	112·7
Goods (million tons)	7·57	7·32
Train-miles (millions)	23·0	24·0
Operating ratio	104·0	99·9
	Million kroner	
Passenger receipts	264·8	278·1
Goods receipts	181·2	209·7
Gross receipts (all services)	549·1	592·6
Working expenditure	571·6	591·9
Deficit (−) or surplus (+)	−22·5	+ 0·7
Depreciation	23·7	26·3
Interest on capital	51·1	56·2
Deficit after charges	95·3	81·8

Increase in the traffic carried by the passenger train, wagon, and road vehicle ferries over the Great Belt and other arms of the Baltic was a notable feature of the year. The 25 ferryboats and other ships made about 48,700 round trips. On the two Great Belt crossings between Korsør and Halsskov, 16 miles, and between Halsskov and Knudshoved, 12 miles, about 50 round trips were made per day, with 5,760,000 passengers, 38,000 railway passenger vehicles, 393,000 goods wagons, and 961,000 motorcars; the last figure shows an increase of 85,000 over the previous year. On the short Elsinore-Hälsing-

borg ferry route between Zeeland and Sweden there was heavy traffic, with 4,063,000 passengers and 300,000 motorcars.

There was an apparent decrease of about 0·4 per cent in the total number of passengers, as the Easter holiday, with its considerable passenger traffic, fell in March in 1959 and in April in 1960. In the Copenhagen suburban area 71·7 million passengers were carried, against 70·9 million in 1958–59; the rise here being mainly in journeys on season and weekly tickets.

The fall in goods traffic was the result mainly of the lack of intensive movement of sugar beet from Denmark to Germany in the autumn of 1959; this had been heavy a year previously. There was also a slight fall in tonnage in full wagon-loads. Smalls traffic, however, increased, very largely because of the acceleration of services.

Rationalisation has led to a further reduction in staff of about 500, or 1·8 per cent; but increases in wages and salaries and reduction of working hours caused a rise in staff costs of about 3 million kroner. To compensate the rise in wages and salaries goods rates were raised from July, and passenger fares from August, 1959. The rise in goods rates averaged 14 per cent: about 11 per cent for wagon-loads and 20 per cent for smalls. Passenger fares were raised 8·5 per cent on average; single fares were increased by 22·8 per cent and return by 6·6 per cent. The supplementary fare for express trains was abolished. There was a surplus on working the State Railways bus services.

Unhelpful Report on Canadian Railway Wages

THE failure or inability of Canadian industrial conciliation boards to address themselves squarely to the question of the railways' ability to pay the wage increases recommended, must lead to unrealistic recommendations, divorced from the inescapable problem of securing earnings to meet the costs entailed. This view is expressed by Mr. Donald Gordon and Mr. N. R. Crump, Presidents respectively of the Canadian National and Canadian Pacific Railways. In a letter to Mr. Michael Starr, Federal Minister of Labour, they state that they cannot accept the report of the Conciliation Board on the dispute between the Canadian railway managements and trades unions representing non-operating railway staff.

The report recommended an increase of some 14 cents (about 1s.) an hr. for these grades on the assumption that the wages of employees in industry generally will increase by that amount in the two years to December 31, 1961; there is no justification, it is stated, for this assumption. There is also no reason, they point out, for assimilating the pay of non-operating railwaymen to that of employees in other industries. The Conciliation Board has ignored substantial differences in the two groups, such as the difference in geographical distribution as between urban and rural areas. From consideration of this fact alone the wage rates of non-operating railway employees are equivalent with the wage rates of non-railway workers. By inclusion in the railway group of operating staff, so as to afford comparability at least with general industry, in which all production workers are included, the result is that railwaymen even now are shown to be paid substantially more than men in other industries.

The railways, the letter adds, are not in a financial position to pay any part of the increased costs involved by the pay increase. Government policy is to not allow any further general increases in freight rates pending the report of the Royal Commission on rail transport. This policy was declared at a time when major sectors in the Canadian economy were insisting that they could not absorb any added transport costs. The Government, by subsidy, has rolled back the last general increase in freight rates granted to meet the increases in cost consequent on the last wage increases to the non-operating employees.

The fact that increases of those freight rates susceptible to adjustment may not produce the additional needed revenue, cannot be ignored. The burden borne by the railways through the maintenance of the statutory and related rates for the movement of grain and grain products is becoming increasingly onerous with each advance in costs. The situation is aggravated by the continuing diversion of traffic to other forms of transport. The Conciliation Board report is content with the statement that the burden must surely be borne by the public at large without indicating how that might be accomplished.

Railway managements are in an economic straitjacket faced with freight rates frozen on the one hand, if unjustifiable added costs are imposed on the other. The revenues of the Canadian National and Canadian Pacific are already lower by $33 million for the first seven months of 1960 compared with the same period of 1959. In the circumstances, it would be unwise to undertake any part of the additional cost burdens implicit in the increases recommended by the report without means of obtaining additional revenues to meet them. In reaching this conclusion the two Presidents declare themselves aware that if the unions involved are determined to force acceptance of the report, they may invoke a railway strike throughout Canada.

North Eastern Region Winter Timetable

ON the East Coast main line the times of most of the northbound expresses from Kings Cross are some 9 min. later from York onwards, in consequence of the extra time allowed for engineering work on the Great Northern line, of the Eastern Region, British Railways, but point-to-point running times over the North Eastern Region remain practically unchanged. The down " Queen of Scots " Pullman is 17 min. later into Newcastle (5.50 p.m.), and 15 min. later into Edinburgh and Glasgow (8.5 and 9.10 p.m. respectively), just as the corresponding up train loses 15 min. to Kings Cross, all south of Leeds.

From Darlington to York, 44·1 miles, there are still one run scheduled daily in 40 min. (66·2 m.p.h.), seven in 42 min. (63.0 m.p.h.), one in 43 min. and one in 44 min., start to stop, while trains not stopping at York, such as the " Talisman " and the " Tees-Tyne Pullman," make still faster times. Other alterations on this main line are few. On Fridays the down " Heart of Midlothian " is now relieved by a new 4.33 p.m. from York to Darlington and Newcastle, and in the up direction relief to the same train is given by starting the 5.9 p.m. from York to Grantham and Kings Cross at Darlington at 4.18 p.m.

Miniature-buffet cars are now provided on the 7.20 a.m. semi-fast from Newcastle to York, the 10.20 a.m. York to Leeds, and the 11.45 a.m. Leeds to Newcastle *via* York, Stockton and Sunderland; also on the 11.35 a.m. semi-fast from Newcastle to York and Leeds and the return working from Leeds at 5 p.m. These buffet workings are with diesel multiple-unit sets. Also with diesel multiple-units miniature buffets are now restored for the first time since the war to the Newcastle-Carlisle service, on the 10.30 a.m., 12.20, 3.20 and 4.20 p.m. from Newcastle and the 1.0, 2.20, 5.25 and 7.0 p.m. from Carlisle.

With the introduction of the interval electric service between Sheffield and Manchester (Eastern and London Midland Regions) the times of the diesel trains between Penistone and Huddersfield and beyond have been altered to make better connections in Penistone; in many cases they afford a time of 50 min. between Sheffield and Huddersfield. The 8.30 a.m. from Halifax to Sheffield Midland, *via* Barnsley, conveying the through coach for St. Pancras, has been altered to start at 8.45 a.m., the 15 min. being taken up by accelerated running and a shortened wait at Sheffield for the 8.50 a.m. from Bradford to St. Pancras. The northbound " Devonian " has been accelerated 15 min., with a start from Paignton at 9.30 instead of 9.15 a.m., but this acceleration is entirely within the Western Region.

Diversions on a considerable scale of Kings Cross-Leeds trains will be necessary for some time on Sundays because of engineering work requiring possession of the tracks between Doncaster and Leeds. Up to November 6, these trains will be diverted from Hare Park to Wakefield Kirkgate, instead of Westgate, and will continue by the former Lancashire & Yorkshire line to Low Moor, where their Bradford portions will be detached, and Leeds, entailing additions up to 50 min. to their times. In the up direction starts from Leeds will be up to 30 min. earlier. The " Harrogate Sunday Pullman " will run to Leeds City instead of Central, and its Bradford cars to Forster Square instead of Exchange, with similar departures in the up direction. From November 13 onwards, these trains will run from between Doncaster and Wakefield *via* Knottingley.

Among minor alterations, Hull now has a new 5.25 p.m. express diesel train to Hornsea in 27 min. The 5.35 p.m. from York to Whitby has been altered to start 20 min. later, in order

to connect with the 2 p.m. " Tees-Thames " from Kings Cross. The 5.5 a.m. from Newcastle to Middlesbrough starts at 5.52 a.m. and runs through to Guisborough. Most of the hourly fast diesel trains between Newcastle and Middlesbrough have had 3 or 4 min. added to their schedules.

Indian Railway Testing & Research in 1958-59

THE work carried out at the Indian Railways Testing & Research Centre, Lucknow, during the year ended March 31, 1959, is the subject of a report a copy of which has been sent us by Mr. K. K. Rao, Director of the Research, Designs & Standards Organisation, Ministry of Railways.

Some of the most important civil engineering tests were carried out on members of the 14 403-ft. main spans of the new Mokameh Ganges Bridge. These carry a single 5 ft. 6 in. gauge railway on their lower decks and a road on their upper decks. Both floor systems are of welded M.S. construction whereas the main trusses are of H.T. steel and are riveted. Microscopic strain-gauges, electrical wire-resistance strain-gauges, Hathaway oscillograph equipment, and Fereday-Palmer stress-recorders were all used on two different spans for comparison at corresponding points. There was close agreement between the comparative results and also between the calculated stresses with percentage impact factors and the measured stresses under test load at various speeds between dead-slow and 30 m.p.h.

Comprehensive tests were also made upon the new 80/90-ton BOBS bogie hopper ore wagons of two slightly-differing types. These were built (*a*) by the Indian Standard Wagon Company, and (*b*) by Waggonfabrik Talbot of Aachen, Germany. The following are some of the distinctive features of each:—

	I.S. Wagon Co. type	Talbot type
Underframe	Mild Steel	H.T. Steel (riveted)
Hopper walls	Straight	Bent inwards at top
,, stanchions	Mild steel	H.T. steel
Tare weight (tons)	29	26
Pay-load ,,	61	54
Gross weight ,,	90	80
Axle-load ,,	22·5	20

The Indian Standard Wagon vehicles showed some weaknesses in early tests, subsequently rectified by strengthening the hopper ends and door-locking gear. The Talbot wagon also sustained minor damage in the tests.

These were of two kinds (1) repeated " free " impact tests under rough-shunting conditions, and (2) static tests. In the former, one stationary loaded wagon coupled to another was subjected to the impact of a third similar loaded wagon fly-shunted into it from a distance of 100 ft. At the resulting impact speed of 5-6 m.p.h., changes in the physical dimensions of the wagon were measured after a succession of so many impacts. In the final tests of the I.S.W.-type wagon it was subjected to 400 " free " impacts, measurements being taken after each series of 100. In the course of 265 impacts on the Talbot-type wagon measurements were recorded after each 20.

Rail fatigue tests were carried out to compare Thomas UIC Specification 722/0 rails with Indian Railway Standard medium —manganese rails. The testing machine at the centre imposes loads up to 30 tons at 42 r.p.m., but at a constant 23·4 to 23·7 tons showed the following average life in terms of million reversals:—

	Thomas	I.S.R., MM.
Unwelded rails	0·98	1·10
Thermit-welded rails	0·37	0·34
Flash-butt welded rails	1·11	1·05

As certain imported rails fractured soon after laying, they were subjected to single-beam ultrasonic tests for flaws.

Of the testing plant brought into use at the Research Centre during the year, the following may be noted. New machines were (1) an axle-bearing testing machine, and (2) a tup testing machine dropping a one-ton weight from any height up to 30 ft. for testing rails, welded rail-joints and concrete sleepers. A carriage was also equipped with soil-testing instruments as a mobile soil-mechanics laboratory. Other plant on order included a 5 ft. 6 in. gauge track-recording car, a metre-gauge dynamometer car, and a spring-testing machine. The latter is designed to test laminated, volute, and helical vehicle bearing springs, both statically and dynamically, in bending, compression and tension. It also tests rubber buffer and drawgear springs, and can exert a maximum static load of 30 tons and the same intensity of dynamic load at 5 to 60 cycles a min. with a stroke infinitely and independently variable from 0 to 20 in.

Observations were continued in building research on raft, sand-pillow, pillar-and-beam, and cast-in-situ pile-and-beam foundations. Also tests were made on the concrete foundations of overhead electrification masts in different soils. Apparatus was devised to apply measured tension horizontally to the tops of masts. Earth pressure was also measured with a Hathaway oscillograph over a brick masonry arch as a check on the empirical provision for the dynamic augment due to impact on such bridges.

In the investigations into the failure of " WP " and " WG" locomotive return-cranks photo-elastic studies were carried out. Another avenue of activity was in the treatment of locomotive feed-water. As supplies of the ingredient copper-vat cutch tannin formerly used had become inadequate, it was essential to find a suitable substitute, if possible of local production. Consequently, wattle-bark extract and myrobalan tannin were both under test and appeared to be proving satisfactory. The latter was also tried in association with Goran tannin, available in West Bengal, a mixture likely to be effective. These are but a few of the activities of the Testing & Research Organisation referred to in the report.

American Railroad Retrogression

(*By a correspondent*)

AT the close of the dismal year 1959 the American railroad industry hoped that freight traffic would improve by 8 per cent in 1960 and make up for some of the losses incurred during the 1958 recession in trade and last year's steel strike. The statement of railway revenues and expenses, issued by the Association of American Railroads on August 22, shows that, in the present unsettled state of the national economy, the railroads are for the third year in succession in a difficult financial position.

For the first half of 1960 total operating revenues of $4,888 million were $137 million, or 2·7 per cent, less than in 1959. What matters in America is freight revenue and at $4,148 million that was $144 million, or 3·4 per cent lower. A small increase of $2·4 million in passenger revenue, less than one per cent, merely raised takings to the insignificant amount of $321 million though expenses were reduced by $64 million, or 1·7 per cent, to $3,839 million, the operating ratio moved up from 77·7 a year ago to 78·6 per cent.

There was a slight decrease of $4·3 million in taxes of all kinds, but the railroads were charged the excessive sum of $542·4 million. Equipment and joint facility rents cost 9 per cent more and the outcome of all these charges was a fall in net railway operating income of $83 million, or 20 per cent, from $413 million to $330 million. The rate of return on property investment for 12 months ended June 30 dropped from 3·42 per cent at June, 1959, to 2·42 per cent.

All the eight Regions to which the railways are assigned shared in the decrease of earnings. The Eastern District was hit most severely, its total earnings for the half year being 35 per cent down. The decline in the Western District was at the rate of 19 per cent. In the East the Pennsylvania's earnings were down 32 per cent and the New York Central's 24 per cent, while the New Haven had the appalling deficit of $7,267,000. In the West the Santa Fe earnings were 26 per cent lower and the Union Pacific was hit just as hard. Of the large railroads working over 2,000 miles of road, the Norfolk & Western was the only one to better its position. By taking over the Virginian coal road in December last, the N. & W. was able to save $4·5 million in operating expenses and add about $1·5 million, or over 4 per cent, to earnings.

What the railroads need is a sharp upturn in wagon loadings, which in 27 weeks to July 9 were 673,720 fewer than a year ago, a 4 per cent decrease. More ore passed to steel works and 35 per cent more flat wagons carried road trailers, but the volume of all other traffics diminished. Grain loadings, for example, were 8 per cent fewer though the wheat harvest was estimated to be the second largest on record. As yet news has not come across the Atlantic of a boom in forwardings being expected in the fall of the year.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Southern Region Coach Liveries

September 12

SIR,—I note with satisfaction that a yellow band above the windows, designating first class accommodation, has now appeared on some British Railways, Southern Region, coaching stock, also a red band on the restaurant car.

Is it too much to hope that this practice, standard with certain Continental railway administrations, will spread to the rest of British Railways ? It is of great help to passengers of both classes, especially at intermediate stopping points, as I know from several years' experience of its use in Switzerland, Italy, and Norway.

Yours faithfully,

JOHN RODGERS

132, Worrin Road, Shenfield, Essex

Riding Qualities of Passenger Coaches

September 17

SIR,—The letter from Mr. F. D. Y. Faulkner, published in your September 9 issue, sets out the official apology for the bad riding of the Kent Coast electric stock of the Southern Region, and the technical reasons for this state of affairs.

I wonder what official line would be taken to explain the appalling riding qualities of the green diesel units of the Western Region ? I frequently travel in these trains between Paddington and Oxford, and because of the vibration in the powered coaches I choose to travel in the trailers. The bouncing action of these vehicles alternates with severe bogie oscillation which culminates at intervals in a devastating lurch; and on the section between Didcot and Oxford, where the permanent way is nothing to boast about, I have seen passengers positively scared.

It is a great relief to get back once more to the standard coaches, hauled by steam locomotives, and running on bogies which were designed by men who obviously understood what they were doing. In my extensive experience of railway travel the diesel units have touched the lowest level of discomfort, and I should like to know what the British Transport Commission is doing about it.

Yours faithfully,

DOUGLAS GRAY

Iffley Turn, Oxford

The Waterloo-Hounslow Line

September 16

SIR,—Referring to Mr. A. E. Durrant's letter in your September 9 issue, I wonder whether his familiarity with the Hounslow line extends beyond the 18-min. journey from Waterloo.

He refers to "the odd sports field," apparently overlooking the seven or eight substantial open spaces within 10 min. walk of Chiswick Station. Kew Bridge, next down the line, serves two office blocks, a vegetable market, a telephone exchange and a waterworks. Brentford and Syon Lane Stations both are in residential areas, but the traffic flow from those districts is towards local industrial plants, not towards London. Hounslow is probably the densest residential district on the line, and the timetable shows three additional up trains calling there during the morning peak.

Mr. Durrant might like to use his 20 min. early at the office one morning to compare the shocking inconvenience of the Hounslow line Waterloo arrivals at 8.52 and 9.22 a.m. with the prodigal luxury of the trains from my home station, Strawberry Hill (not Twickenham) which arrive at 8.49, 8.54, and 9.18 a.m.

If I were to use Twickenham Station, the loss of one train thence would not unduly perturb me; but the 600-800 passengers in each train from stations from beyond Twickenham to Mortlake might resent transfer of their train to a line which the traffic would not even half fill the train. They might point out that their line gets 12 trains an hour, not because the Southern Region has some irrational prejudice against Hounslow people, but because the number of passengers to be carried is far higher.

Yours faithfully,

L. A. MACK

13, Upper Grotto Road,
Twickenham, Middlesex

Diesel Traction in Germany

September 12

SIR,—From Mr. Bell's letter in your September 9 issue, it would seem that he is unaware of the entirely different conditions obtaining in the U.S.A. in 1947 and in Germany today. Of the 35,000 steam locomotives in the U.S.A. in 1947, some three quarters were over 25 years old, a legacy from restricted building during the depression and the war of 1939-45. The diesel makers naturally made the most of this by comparing the best diesel performances with "average" steam work, but now the replacement is virtually complete it would seem that the improvement per unit cost is less than first claimed and in fact less than when obsolete steamers were replaced by more modern examples.

In Germany today the steam stock is largely modern, whilst there are several long-term electrification schemes in hand. As this modern steam power is quite adequate to cope with the traffic until electrification, there is simply no need to spend large sums on dieselisation merely to "keep up with the Jones's," and the German Federal Railway is to be congratulated upon keeping their heads and laying down a sensible motive power policy.

Yours faithfully,

A. E. DURRANT

7, Spencer Road, London, W.14

Train Heating in Diesel Traction

September 9

SIR,—I have read with interest the article appearing on pages 236 and 237 of your August 26 issue, dealing with the problem of adequately heating trains which are drawn by diesel locomotives.

The possibility of using the waste-heat content in the exhaust-gas of the diesel engines for heating the train is one that has received much attention in the past and I have been personally concerned with successful waste-heat installations in railcars.

One difficulty in the full development of waste-heat boilers for diesel traction is that of obtaining the co-operation of the railway authorities to install a waste-heat boiler on a locomotive and try it out thoroughly in service. Until such a boiler is well tested on a main-line diesel locomotive there is little likelihood of any further developments being made in waste-heat boilers for diesel traction.

While it is fairly simple to build a prototype oil-fired boiler and test it out in the workshop, it is not possible to do the same with a waste-heat boiler. The problems of controlling steam output and overcoming the difficulty of providing steam when the diesel engine is not running can only be solved by experiments under service conditions.

It must be appreciated that with modern high-powered diesel locomotives of 2,500 and 3,000 b.h.p. the heat content in the exhaust-gas is far more than is required to heat a normal train, and it would appear that a sensible solution would be to design a boiler that utilises only enough of the exhaust-gas available from the diesel engine to cater for the minimum steam requirements of the train, and to provide that boiler with an oil-fired booster to make up the difference between minimum and maximum requirements.

Yours faithfully,

R. W. C. BLACK,
Managing Director

Spanner Boilers Limited,
Wokingham Road, Bracknell, Berks

THE SCRAP HEAP

On the Wrong Lines

"Some trackmen will tell you a man with light-coloured eyes will never make a good track line. Never mind that old woman's talk. . . ."—*Quoted in "The Railway Engineer," June, 1883 issue, from a letter in the New York "Railroad Gazette."*

Fare Dodging in 1900

Officials of the Central London Railway have discovered that the present system of cancelling tickets by the traveller dropping his ticket into a box lends itself to fraud, particularly where large numbers of passengers are crowding through the barriers to enter the lifts. . . . The attendant is unable to make any real examination of the tickets while he is working the hand lever which cancels them, and unscrupulous persons have taken the opportunity to drop tramway and bus tickets into the box.—*From "The Financial Times," August*, 1900.

Reproduced by permission of ["The Pennsylvania" and the Pennsylvania Railroad

"When are you going to get over this crush for railroad men?"

Narrow-Gauge Train Catering

The buffet-composite coach of the Jugoslav Railways shown in the illustration, and the diesel railcars including buffet compartments on the Jugoslav 2-ft. 6-in. gauge lines, are believed to be the narrowest-gauge refreshment cars in Europe and probably in the world. The 1-ft. 11½-in. gauge Festiniog Railway vehicle converted for sale of mineral waters and light refreshments can hardly be counted. It is not fitted with vestibule connections, and most sales seem to be to clients standing alongside the track. The most remarkable narrow-gauge vehicles including refreshment facilities were the combined restaurant and sleeping cars running on the 2-ft. 6-in. gauge lines (since converted to metre gauge) of the Antofagasta (Chili) & Bolivia Railway in the early years of this century. Built by the Gloucester Railway Carriage & Wagon Co., Ltd., they were a triumph of rolling stock design. They were 49 ft. long, 7 ft. 8 in. wide outside sheeting and 6 ft. 11 in. wide inside, and weighed 17 tons 6 cwt., and were borne on two four-wheel bogies. They accommodated 10 first class passengers, five in upper and five in lower berths. By day the upper berths were pulled up on rollers and the lower converted into arm-chair seats with adjustable tables for service of meals. The berths were 6 ft. 6 in. long and 2 ft. 3 in. wide. Ample lavatory accommodation was provided.

Antiquity the Attraction

The Brighton Entertainments & Publicity Committee has rejected a proposal to equip the 2-ft. 8½-in. Brighton Electric Railway along the sea-front with streamline coaches, as it is considered that the antique appearance of the existing rolling stock is an attraction for holidaymakers. Instead, the present nine vehicles are to be renovated so that they will last another five years. The line was designed and built by Magnus Volk, Electrical Engineer to the Brighton Corporation. Inaugurated in August, 1883, it was the first electric railway in Great Britain. In its original form it was worked for some six months. At first the running rails, which were spiked to longitudinal tar-coated sleepers, were used as conductors. The gauge is believed to have been 2 ft. The railway was re-constructed in 1884, when the present gauge was adopted. It has been operated by Brighton Corporation since 1940.

Photo] [*J. H. Price*

Buffet-composite coach on Jugoslav Railways 2-ft. 6-in. gauge lines

His Own "Back Garden"

Mr. George Poole, employed at East Acton Station on the Central Line of London Transport, finds the station garden, which has won the 1960 challenge cup for the best-kept L.T.E. garden, as an excellent substitute for one of his own. Mr. Poole, who lives in a flat, has never had so much as a window box of his own, only a geranium in a pot, which is now planted proudly among the other cup-winning plants.

Kind to Couples, 1892

The anonymous author of *Railways and Railway Men*, published by W. & R. Chambers in 1892, wrote of the railway guards of those days that they were the best friends of newly-married couples: ". . . . There is not a guard throughout the country who will not do his level best for them." Courting couples were not quite so favoured, and were "soon detected by his experienced eye," but he would "do a good turn for them occasionally."

Runaway Goods Train

A passenger train of the Victorian Railways ran into the rear of a goods train hauled by two diesel-electric locomotives, which was leaving a station near Melbourne. The impact threw the two enginemen of the goods train out of their cab, and caused the train to move forwards. The air brake acted, but did not stop the train, which gathered speed. It is reported to have run at 70 m.p.h. through three level crossings. Eventually it was switched on to a siding, where it ran into stationary wagons without serious damage to locomotives or stock.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

NEW ZEALAND

Cook Strait Ferry

Plans are going ahead for the Wellington terminus for the car-rail ferry. It has recently been announced that the Railway Department, and the Wellington Harbour Board, have agreed to a site at one end of the existing wharves, and that the Wellington City Council and the Ministry of Works are both in favour of this proposal. An outline scheme has been prepared by the Harbour Board the cost of which is estimated at £340,000. The Chief Engineer of the Harbour Board has stated that the design of the 90-ft. long link span is well forward, though detailed design on any of the wharf structures or other parts of the installation has not yet been started. Tenders for the main wharf construction will not be called for several months yet.

VICTORIA

Wanton Damage to Railway Property

Vandalism costs the railways about £56,000 a year. Although electric light globes used in coaches are of no use for domestic purposes because they are of the screw-in type and of a special voltage, some 22,000 of them are stolen each year. About 1,000 cushions were thrown from trains last year, and nearly 2,000 windows and other glass fittings were broken. A gang of 18 men has to be permanently employed repairing stock damaged wantonly. Schoolchildren and irresponsible youths are believed to be the main offenders.

New Station on Mornington Peninsula

A station is to be opened on the Frankston to Stony Point line between Frankston and Langwarrin, to replace the present halt for rail motors.

Overline Bridges Lengthened

Between Seymour and Mangalore road traffic on the Hume highway crosses the Melbourne-Sydney 5-ft. 3-in. gauge, single line railway by an overline bridge. This is being lengthened by 45 ft., to clear the new standard-gauge line.

INDIA

Shortage of Locomotive Coal

Over two hundred goods trains were cancelled on the Northern, North Eastern Railway, and North-East Frontier Railway between February 1 and May 31, 1960, because of the shortage of coal for locomotives. This is attributed by the Railway Board to insufficient dispatches, as during this period of the year, the demand rose for wagons for other essential traffic. Availability of wagons for movement of coal is being substantially increased.

Doubling on East Coast Line

Doubling of 12 miles between Rajamundry and Dwarapudi on the East Coast line of the Southern Railway from Madras to Vizagapatam was recently almost complete. Doubling of 19 miles between Dwarapudi and Samalkot is expected to be completed by June, 1961.

Pipe Line Over Brahmaputra Bridge

The Railway Board has rejected the request of the Assam Oil Company to take a crude oil pipe line of the Oil India Limited over the Brahmaputra Bridge, now under construction, because of the danger of fire.

Barauni–Samastipur Broad-gauge Line

Laying of the broad-gauge track from Barauni to Samastipur, on the North Eastern Railway, is due to be completed by June, 1961. The new line will give through running from Calcutta and the industrial area of Bengal and Bihar to Samastipur, an important traffic centre in North Bihar.

MALAYA

Appointment of Malay Officers

At the declaration of independence, on August 1, 1957, there were 68 expatriate officers on the Malayan Railway. As at August 1, 1960, there were 22, of which three were on short-term contracts; two more are expected to leave before the end of this year.

Inquiry into Railway Disputes

Publication of the findings of the Commission of Inquiry into Railway Disputes was expected recently. The Commission offered to hear any member of the railway staff who wished to state a grievance.

SOUTH AFRICA

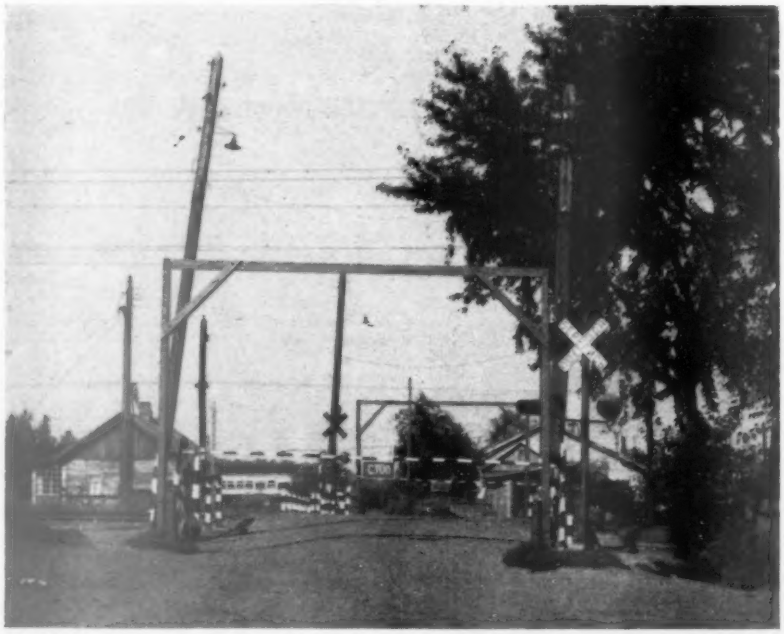
New Rolling Stock

During August, 1960, the South African Railways placed eight diesel-electric and seven class "5EI" electric locomotives in service, as well as 20 official coaches and 526 goods wagons of various classes. Included in the goods stock were nine steam-heating tenders for winter heating of electrically hauled trains.

Railway Purchases

Several large orders were placed by the South African Railways during July, 1960, of which the largest was for steel tyres to the value of £134,199 from Unisteel Africa (Pty.) Limited, Johannesburg. Orders of £38,641 and £87,250 were placed for timber; £56,779 for steel axles and £51,277 for electric machines and motors. Four orders,

Boom Barriers in Russia



Photo] *[J. O. Slezak*

Road crossing, equipped with boom barriers, over an electrified line of U.S.S.R. Railways, showing wooden clearance gauge for road traffic

ranging from £28,639 to £75,234, were placed for various types of vehicles for the road transport services.

EAST AFRICA

Delivery of Diesel Locomotives

The first two main line diesel-electric locomotives for service on the Kenya/Uganda line arrived recently at Mombasa on the ss. *Tingtagel Castle*. The remaining eight locomotives, forming a £1,000,000 order, have been completed by Robert Stevenson & Hawthorns Limited at its Darlington works, and should be received in East Africa during the next two or three months. The first two locomotives have arrived at Nairobi where they are being tested and painted in the Railway maroon livery and will subsequently go into service hauling goods trains between Nairobi and Nakuru.

Lake Victoria Vessel Launched

The rms. *Victoria*, East African Railways & Harbours new passenger vessel for Lake Victoria, was launched on September 5. It has been moved to one of the cargo berths at Kisumu port where the main engines are being installed. Later it will be moved into the Marine Dockyard which will be used as a fitting-out berth. An official naming and commissioning ceremony will be held when the ship is ready for service in the second quarter of 1961.

The *Victoria*, which will cost about £686,000 when completed, is being equipped with twin diesel engines each developing 850 b.h.p. It will have accommodation for 38 passengers in first class cabins and 30 unberthed; 66 in second class cabins and 10 unberthed; 144 in third class berths; and 206 on deck.

JORDAN

Repairs for Hedjaz Railway

Jordan has decided to transfer £100,000 to the executive committee of the Hedjaz Railway administration in Damascus to enable repair work to begin on the Hedjaz line. The line, between Ma'an in South Jordan, and Medina, in Saudi Arabia—a distance of about 460 miles—was destroyed in the First World War by forces under Colonel T. E. Lawrence.

BRAZIL

Purchase of Railcars

Rede Ferroviaria Federal has authorised the purchase from the Budd Company of 23 railcars at a total cost of $ U.S. 4,438,250 to be debited against the unexpended balance of $45 million of the $100 million Eximbank loan. The Budd Company's offer was preferred to that of the American Car & Foundry Division, which was lower by $ U.S. 160,700 or 3·7 per cent. The Board explained that R.F.F.S.A. have 209 Budd coaches and six railcars running and it seemed advisable to maintain the standard. The stock consists of two saloon type and two buffet type railcars of 5-ft. 3-in. gauge, and 11 saloon type and eight buffet type of metre gauge. Noroeste do Brasil is to receive five railcars; R.V. Parana-Santa Catarina, five, Rede Mineira de Viacao, four; and E.F. Central do Brazil, four.

COLOMBIA

World Bank Loan

The National Railways has started negotiations with the World Bank for a loan, amounting to U.S. $5,000,000. The money is being sought to finance the buying of equipment for the lines that will be intergrated when the Atlantic Railway is completed.

ARGENTINA

Improvement Plan

The Argentine State Railways has decided to grant a 45-day extension to the period in which offers for participation in the improvement plan, reported in our issue of July 15, will be received.

Publications Received

The Railwayman's Diesel Manual. By William F. Bolton, A.M.I.Loco.E. London: G. H. Lake & Co. Ltd., 283, Archway Road, N.6. 7¼ in. by 4¾ in. 168 pages. Illustrated. 12s. 6d. net.—This is the third edition, in four years, of a book designed specifically to assist in the training and self-education of the motive power staff on British Railways who are handling diesels daily. In the earlier editions, naturally, the emphasis was on railcar equipments, in the present edition more space is given to locomotive oil engines and transmissions. Mechanical portions are not covered, the contents dealing with engines; cooling and fuel injection equipment; electric, hydraulic and mechanical transmissions for railcars and locomotives; controls; and automatic vacuum and air brakes. Many men with something of the author's experience are not good teachers. Here the text is terse, clear and relevant to a degree practically never found in a book of instruction for drivers and maintenance personnel. Moreover, author and publisher have collaborated with distinct success in regard to illustrations; the coloured diagrams of transmission and brake layouts and components are strictly utilitarian but well reproduced. We have found only one error, and that only a *lapsus calami:* the Maybach engine (bottom of p. 66) is a four-stroke, not a two-stroke.

Train at Timken.—This is the title of a 30-page book describing the comprehensive scheme for training young men and women entrants into the British Timken organisation on the technical and commercial sides. According to the list given, 30 specific occupations come within the scheme, of which almost three-quarters may be termed technical and the remainder commercial or administration. Copies are available from the Publicity Department, British Timken Division of the Timken Roller Bearing Company, Duston, Northants.

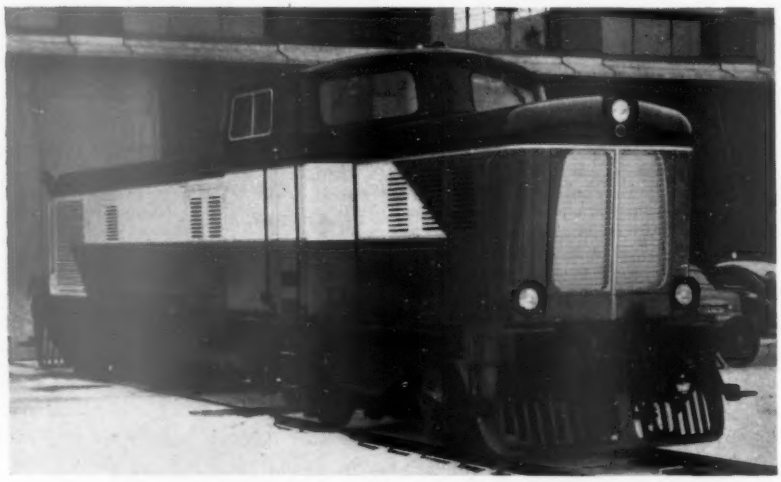
Railroad Equipment Financing. By Donald MacQueen Street. London: Oxford University Press, Warwick Square E.C.4 (in U.S.A. by the Columbia University Press). 8 in. x 5¼ in. 178 pp. No illustrations. Price 48s. net.—It is well known that many of the 28,500 diesel locomotives on U.S. Class I railroads are not owned by the railroads over which they run, and bear small brass plates stating the ownership. This book tells why and how with a wealth of financial and legal detail. It shows that this hire-purchase, sheer hire, lease-lend or what you will is not confined to diesel stock, but has been practised on a large scale all this century and even before, particularly for freight rolling stock. Many of the reasons for this practice, said to date back to 1839, arise from the particular methods of North American railway finance and operation, and the often very peculiar legal and taxation relations between railroads on one hand and the Federal and State authorities on the other hand. But the spread of what have come to be called American financing methods to the railway domains of the other five continents make this book of especial interest to the higher directions and managements of railways everywhere; and for them there is no lack of specific information on the various possible types of equipment obligations, conditional sale contracts, and lease arrangement; and there is also a cogent chapter on experience in receivership and reorganisation.

Turbo-Chargers.—A detailed illustrated description of the Hawker-Siddeley-Brush exhaust-gas turbo pressure-chargers of the three current groups, series 20, 30 and 35 is contained in a brochure no. 61022/2, obtainable from Hawker Siddeley Brush Turbines Limited, Hucclecote, Gloucester.

Russian Locomotive Types. By J. N. Westwood. Published by the author, at Oakleigh Close, Backwell, Bristol. 7 in. x 5 in. 104 pp. Illustrated. 10s. ($2) net.—Essentially this is a book of 32 diagrams of existing Soviet locomotive classes, steam, diesel and electric supplemented by four pages of photographs. Each class illustrated has a supporting page of text giving salient data; and at the front of the book is a 13-page section giving a summary of locomotive building and development in the old Russia and new U.S.S.R., which is a masterpiece of condensation, with absolute balance, and with only one omission—the name of Lomonossoff as the first driving force in U.S.S.R. diesel traction. With one exception the diagrams are clear and the dimensions legible, and the quality of production of this comprehensive publication is excellent.

Motala Diesel-Turbine Locomotives

A promising combination of two prime movers which has passed the experimental stage and is now available in standardised designs



Motala 1,500-h.p. 62-ton diesel-turbine locomotive

FIVE years ago a prototype locomotive on a new principle, the Geislinger, was built in Sweden, and attracted some attention at the time. Since that time the locomotive, a 70-ton 1-D-1 machine of a little over 1,000 h.p., has been steadily at work in mixed service on the 40-mile Stockholm-Nynas Railway, and has now covered over 275,000 miles. Meanwhile, the builder, A. B. Motala Verkstad, after a year or two of experience of the operation of this unit, put in hand another locomotive of almost 50 per cent greater output, and running on a double-bogie chassis instead of on a rigid plate-frame type. The weight of this second locomotive is 62 tons, but though its top designed speed is 75 m.p.h. in actual service Swedish track conditions on secondary lines are imposing a service maximum of 56 m.p.h. This locomotive has been in operation since February last, and has now covered about 30,000 miles, much of this total being built up on the 104-mile Nässjö–Kalmar line.

Principles

The principle adopted is due to Dr.-Ing. Leonhard Geislinger, and seeks to combine the advantages of a diesel engine with those of a gas turbine, and thus to simplify the transmission in some degree and, more important, to do away with all time ratings in the transmission. Referring to the drawing, the diesel engine drives through step-up gears 2 and 3 the planet carrier six of the multi-step differential gearbox 4, and from which pinion 5 drives the air compressor 11. Crown wheel 7 of the differential has two sets of gear teeth; the inside ones engage the planetary gear wheels, the outside ones engage the gear wheel 8 fitted on the transmission output shaft 10. A portion of the engine output is thus absorbed by the compressor and the remainder transmitted to the driving axle. Part of the air delivered by the compressor 11 through the intake manifold 16 forms the combustion air of the diesel engine, the charging pressure being about 1·2 atm. (17 lb. per sq. in.) at full load; and this air is passed through a charge-air cooler 14 on its way from the compressor to the engine.

Use of Exhaust Gas

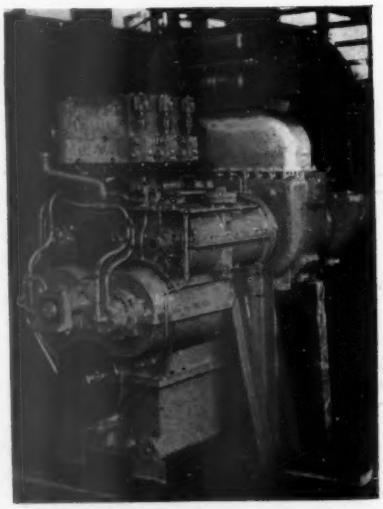
Additional to this, the engine exhaust gas is passed not direct to the atmosphere, but through the exhaust manifold 17 to a so-called mixing chamber or combustion chamber 15, where it mixes with that part of the air from the compressor which was not used in charging the engine. The mixture of air and exhaust gas is led to an exhaust-gas turbine 12, and this is connected to the transmission output shaft 10 by the fixed-ratio pair of wheels 9 and 8. It will be remembered that wheel 8 is also the final one in the drive from the engine through the differential.

Thus the mechanically delivered output of the engine is augmented for traction purposes by some of the energy in the exhaust gas applied with the torque-speed characteristics of a gas turbine; and the mechanical output of the engine is transmitted through the differential with the high efficiency and torque-speed characteristics of a purely mechanical transmission with change-speed mechanism, for the differential gearing itself is arranged with two or three speed-change steps which are automatic in operation, and change according to track speed irrespective of the load.

In operation, from a standing start the gas turbine delivers the majority of the power transmitted to the axles, up to 60 per cent at zero speed, and then the proportionate turbine output falls gradually, the proportionate value at top track speed being about 40 per cent of the total. Another distinctive feature of the Motala diesel-turbine locomotive is that total output, and proportionate output of the turbine, can be increased by introducing fuel oil into the mixing chamber 15, and burning it there, the mixing chamber then becoming a proper combustion chamber. Thus, in effect the turbine then becomes a combustion-gas turbine as well as an exhaust-gas turbine. The tractive effort at any speed is thereby enhanced, but the shape of the speed-tractive effort curve is not materially altered.

Assuming that at some given speed 50 per cent of the engine power is being transmitted directly through the differential and the remainder is being absorbed by the compressor, the compressor then delivers half the quantity of air it would furnish if it were absorbing the full engine power. On the other hand, the heat contained in the exhaust gases does not vary for any given engine power. On the assumption even that the weight of the gas in the gas-air mixture is not more than one half, the temperature of the mixture will be raised considerably above that of the pure air from the compressor, so that the turbine output is increased well above what it could be if the turbine was fed only with air. The turbine output actually can be much higher than the power delivered by the compressor, because the exhaust gases entering the combustion chamber at the charging pressure of 1 to 2 atm. mentioned earlier contain 35 to 40 per cent of the heat in the fuel, and turbine power is in proportion to the absolute temperature of the mixture at the turbine inlet.

Temperature of the air/exhaust-gas mixture passing into the turbine is com-



Complete gearbox including air cooler, turbine and combustion chamber at far end

paratively low; under full output it is of the order of 320/325° C. But the combustion or mixing chamber, in 15 the drawing is fitted with a burner, and fuel-oil injected and burned, so raising the temperature of the mixture higher still.

As turbine output is proportional to the absolute temperature, so it is raised substantially without affecting the power from the engine delivered through the differential. Practical considerations of temperature within the combustion chamber, and of the specific fuel consumption, limit the amount of fuel which can be burned in this way, and also the length of time the burner can be kept on, for obviously the specific fuel consumption is measurably higher than that of the diesel engine. The burner can be adjusted with infinite variation from zero up to the maximum amount, which corresponds generally to an increase in h.p. of 15 to 20 per cent. But there is always this reserve of power available for periods of rapid acceleration or hill climbing; and it may be said that with this feature in operation to the maximum practicable extent the Motala diesel-turbine locomotive has a r.h.p. equal to 90–95 per cent of the b.h.p. of the engine, and taking into account all power needed for driving auxiliaries. In another way, it can be said that a Motala diesel-turbine locomotive with an oil engine of 1,200 b.h.p. and with the supplementary burner in full operation is the power equivalent of an ordinary diesel-electric locomotive of about 1,500 b.h.p., partly through this extra power feature and partly because of the high mechanical efficiency of the transmission.

Distinctive features of this Motala diesel-turbine locomotive are:

(*a*) The traction characteristics are those of a gas turbine combined with mechanical change-speed transmission from a reciprocating oil engine; and though there is a momentary break in tractive effort at change-over points the speed-tractive effort curve is generally smooth; in the two locomotives currently at work the shape of this curve is concave to the speed base, but

(*b*) A smooth and gradual start, with high effective adhesion values, is always possible, and with high torque, as most of the tractive effort at starting and low speeds comes from the turbine.

Simple Transmission

(*c*) Though there is some complexity in the control construction, the transmission itself is essentially simple, with inter-dependent and automatically operating constituents.

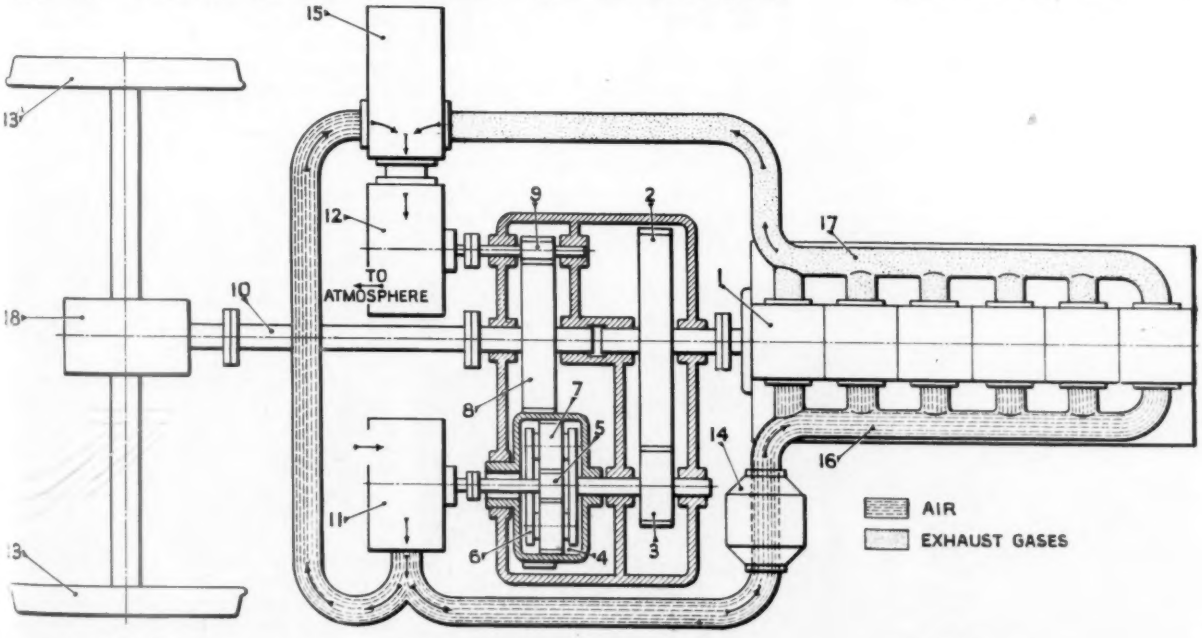
(*d*) There is no short-time or continuous rating of the transmission, and from that aspect any tractive effort-speed combination which can be generated can be kept on as long as desired. The only part of the whole system into which a time element enters is the length of time the supplementary burner for the overload power is kept on; and then the limiting factors are mainly temperature in the combustion chamber itself, and, under high load, in the turbine, though in the latter case there is a substantial margin for the turbine itself is of a type which normally withstands 550/600° C. as a continuous value, whereas without supplementary burner in operation the gas-air mixture at full load does not exceed about 320/350° C.

(*e*) The principal constituents are all machines well tested and proved in railway service. The engine can be of any make. The turbine and compressor are from normal standard Brown Boveri or other makes of exhaust-gas pressure-chargers, already running in thousands, though here they are in two parts mounted on separate shafts; thus not only performance but also spares service, maintenance, replacement and repair are along well-established lines, and the turbine itself is not generally operating under such arduous conditions as it may do in a pressure-charging installation. The epicyclic and other gears and the multiple-disc clutches in the transmission are also nothing unusual. The whole design is simply a new combination of well-tried elements, but a combination from which good railway features are not absent.

(*f*) The simplicity and lightness of all constituents gives an inherent favourable power: weight ratio for the locomotive as a whole, and there is nothing to limit the adoption of the most modern mechanical-portion designs having all weight available for adhesion, small weight-transfer, and high top speed. Great power on very moderate weight and low axle load (e.g. 1,500 h.p. maximum on 15½ tons axle load) are quite practicable.

(*g*) As the system in a sense is the equivalent of a non-pressure-charged engine of four-stroke type working in a high-pressure atmosphere, and with the compressor tied to the charging and turbine systems, the operation at high altitudes can be very favourable, as the compressor automatically provides more air, and the power output and tractive effort-speed characteristics are more nearly those at sea level than are those of a normal exhaust-gas turbo-charged installation.

(*Continued on page* 362)

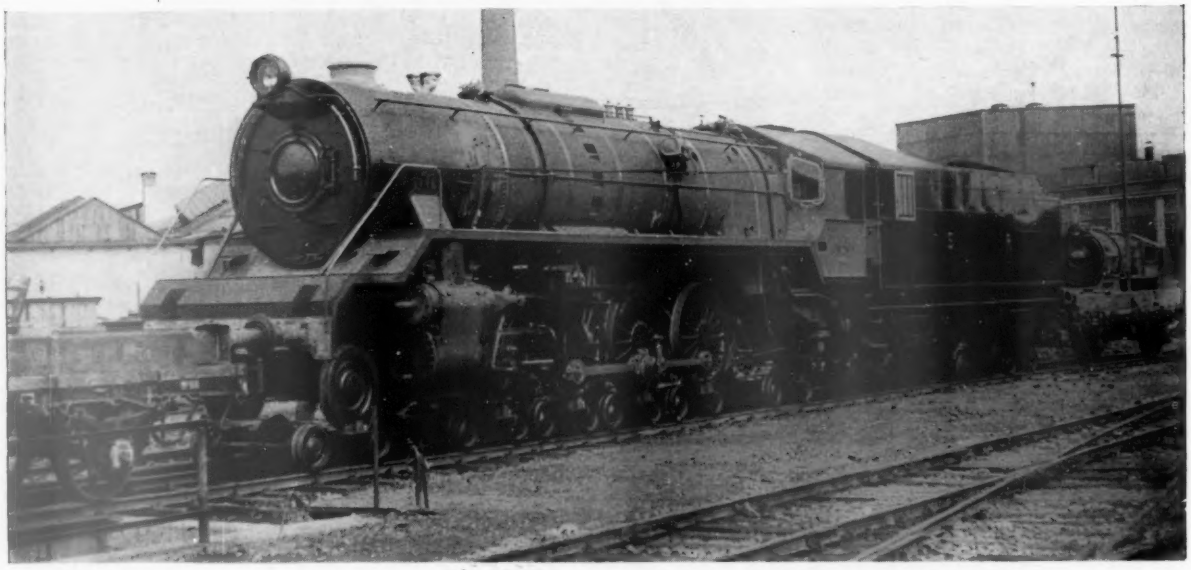


1—Diesel engine
2—Step-up gear
3—Step-up gear
4—Differential
5—Compressor driving gear
6—Planetary gear retainer
7—Differential case
8—Gear on transmission shaft
9—Pinion on turbine shaft
10—Transmission output shaft
11—Compressor
12—Turbine
13—Driving wheels
14—Charge-air cooler
15—Combustion or mixing chamber
16—Induction manifold
17—Exhaust manifold
18—Axle drive

Schematic representation of the Geislinger system of locomotive power and propulsion

Transporting Out-of-Gauge Motive Power

Small rollers with clamping device for moving broad-gauge locomotives from Austrian manufacturer's works over standard-gauge track



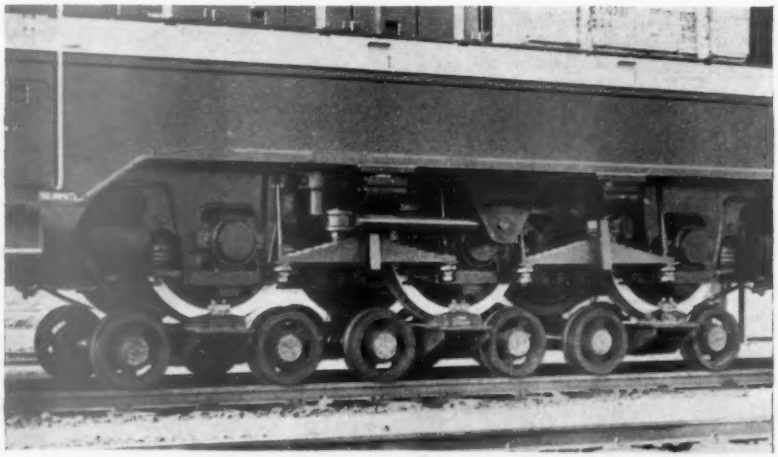
Broad-gauge 2-8-2 *Indian locomotive on transporter trolleys about to leave Floridsdorf for Trieste*

VERY considerable additions to the nominal purchase price ex-works of railway motive power and rolling stock may be expected if the units have to travel any distance, more particularly in that fully-erected condition which is naturally favoured by the purchaser. Whatever the shipping arrangements, rail or road transport over a short or long distance is often involved as a first stage in the journey, and as many of the exports from Great Britain and Europe are for loading gauges in excess of the standards, and rail gauges different from the standard, special or out-of-gauge rail transport may be necessary.

To provide the simplest possible means of transport over a wide range of motive power, Simmering-Graz-Pauker A-G. some time ago evolved a system of small transport rollers which have been used successfully on a variety of steam and diesel locomotives travelling over long distances to their destination or port of shipment. Each transport roller consists of a short cast-steel frame housing two pairs of 500-mm. (19·7-in.) wheels running on the 4-ft. 8½-in. gauge tracks, and a clamping device to hold the wheels of the locomotive or vehicle being carried. Each wheel-and-axle set of the load being transported is supported on one of these two-axle trucks.

Two-axle Trucks

This truck type is generally similar to the old diamond-frame type of wagon bogie, but is without springing, and the axleboxes are of two-part plummer-block form with the two parts bolted together. Between the wheels the cast-steel frame extends outwards, and at the sides are clamping blocks designed to fit over the tread and wheel rim. These clamping blocks can be put at any lateral spacing to suit the rail gauge of the load being transported; but if any large shipments are being made, the trucks are made up with the clamping blocks welded permanently in the exact position.



Close-up of three trolleys below diesel locomotive

As at the bottom of page 361, the load is taken through the wheel tread, with lateral location against the face of the wheel rim and the vertical clamp screwed down against the crown of the rim. In the transport effected up to the moment by this means the height of the wheel tread of the load being carried above the track rail level has been about 420 mm. (16·5 in.), but some variation in this is possible in the design stage to suit the load to be transported.

Conveyance of Broad-gauge Engines

The first use of this method on any large scale was applied by S.-G.-P. to the transport of 60 steam locomotives of Class "WG" and 5-ft. 6-in. gauge for the Indian Railways, and subsequently to the carriage of 30 of the "WP" class 4-6-2 locomotives for the same customer. Transport was necessary over several hundred miles, from the Floridsdorf works in the north-east suburbs of Vienna to the Adriatic port of Trieste, and involved travel over the Austrian Federal and Jugoslav and Italian State Railways.

Designed height above rail level of the "WG" locomotives is 4,229 mm. (13 ft. 10¾ in.); the loading-gauge height of the

Austrian and Jugoslav Railways is 4,650 mm. (15 ft. 3¼ in.), so that when the locomotive was mounted at the height of 420 mm. above rail level the clearance to the loading gauge was only 1 mm. (4,650 mm.—[4,229+420 mm.]). These "WG" locomotives infringed the loading gauge at the upper corners of the cab, but a gap of 6 mm. (0·25 in.) could be maintained between the cab and the structure gauge. With such tight clearances a commensurate supervision of construction, loading, and travel was needed. In Italy the loading gauge height is 4,300 mm. (14 ft. 2 in.) and as the Italian section of the route is electrified at 3,000 V. d.c., it was necessary to shut off the current during the passage of the special train, otherwise the necessary electrical clearance could not have been provided.

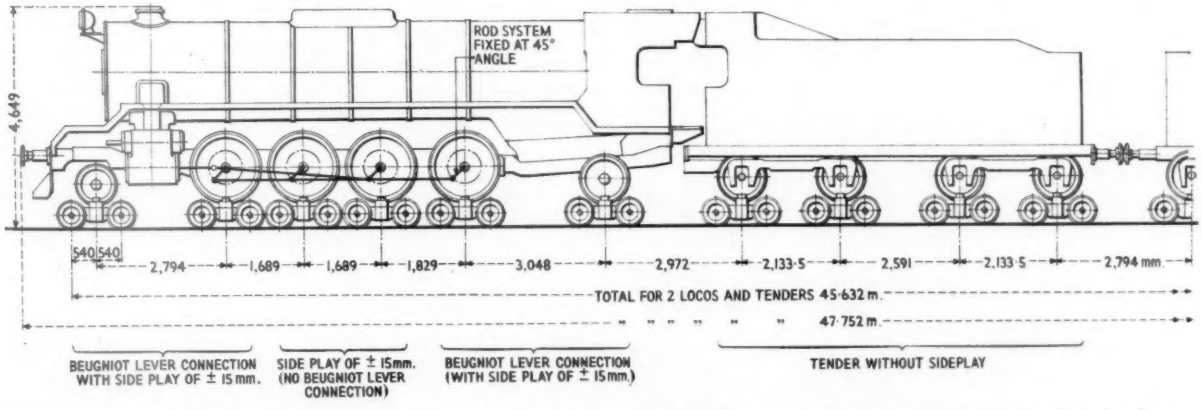
Soviet 5-ft. gauge 110-ton diesel locomotive on transporter trolleys in special train en route from Vienna to the Hungarian U.S.S.R. frontier

Train Formations

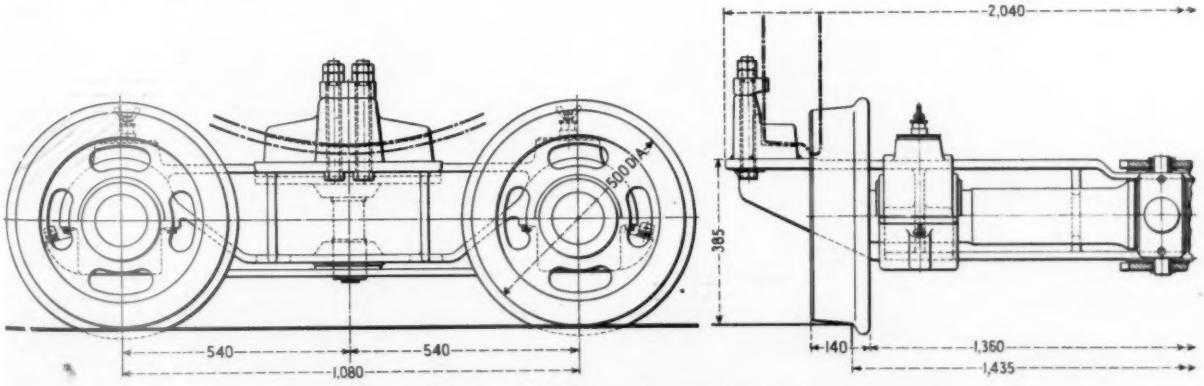
Transport was arranged so that two locomotives and tenders were sent together in one train, the tenders being coupled up normally to their locomotives. At each end of a locomotive-tender unit was a match wagon with buffer height at the inner end altered to correspond with the mounted height of the Indian locomotive side buffers. Further, the locomotive-tender unit was piped down its length so that the compressed-air brakes could be applied to all wagons included in the train formation.

The train composition was made up, in addition to the match wagons and transport rollers, of a sufficient number of wagons to provide the necessary brake power for safe descent of the ruling 1 in 40 gradients and apart from the train-tool wagons these wagons were revenue-earning wagons destined for Trieste with no priority movement. Curves on parts of the route are as sharp as 190 m. (9 ch.) radius.

Because of the extensive civil engineering and other constructional work being carried out on the Semmering line in connection with electrification, it was necessary to adopt a roundabout route from works to port. This was from Floridsdorf west along the north bank of the Danube to Tulln, then over the river to St. Pölten, along the western main line to Amstetten, and south *via* Selzthal, St. Michael, Villach, Rosenbach, Ljubljana, and Poggioreale Campagna, to Trieste. When the civil engineering work on the Semmering was completed it was possible to send the remaining locomotives direct from Vienna over the



Loading diagram of Indian "WG" locomotive and tender on trolleys; two groups are coupled back to back

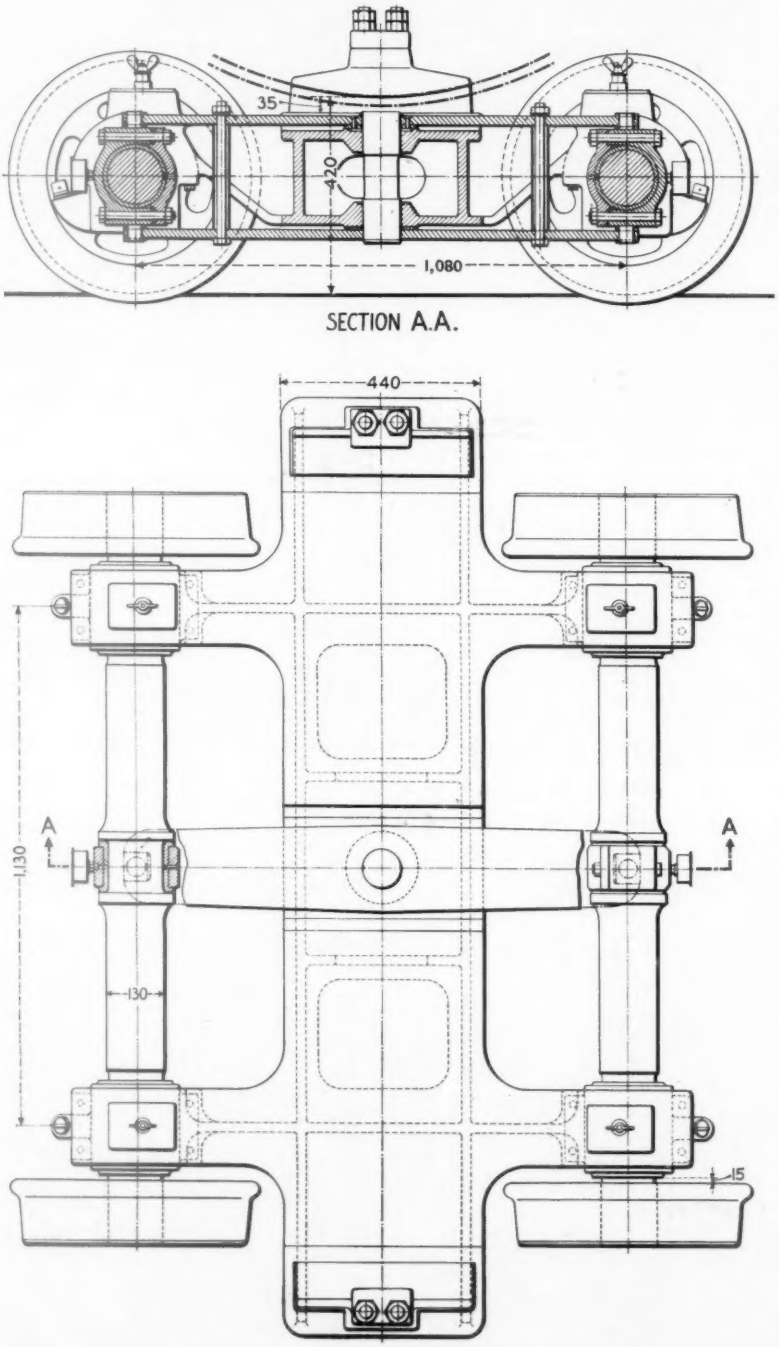


Elevation and end view of normal trolley

Südbahn to St. Michael, and thence as detailed above.

As two locomotives were sent in a train, 30 special trains were needed for the "WG" locomotives and 15 for the "WP" type. The total journey of 386 miles was closely scheduled throughout, and at an end-to-end time of 75 hr. Maximum speed at any point on the line was limited to 30 km.p.h. (18·6 m.p.h.), but when passing points and crossings a limit of 10 km.p.h. (6·2 m.p.h.) was enforced. Transport of all 90 locomotives was effected without any derailment and without any delay to ship sailing times.

Transporter trucks of the same design have been used also for the carriage of 110-*tonne* (empty) C-C diesel-hydraulic locomotives from the Floridsdorf works to the U.S.S.R. border, travelling *via* the Austrian Federal and Hungarian State Railways to obtain the necessary clearances. Fortunately, these diesel locomotives were not built up to the full 5·2 m. (17 ft.) of the Russian loading gauge, the rail to cab-top height being 4·21 m. (13 ft. 10½ in.), so that the total height of the moving load could be kept to 4·63 m. (15 ft. 3 in.). In this case each diesel locomotive went in a train of its own with the necessary match wagons, tool and other wagons, and a small passenger carriage for the travelling personnel, as illustrated at the top of page 361. Top speed was limited to 28 km.p.h. (17·5 m.p.h.), and restricted to 10 km.p.h. (6·2 m.p.h.) over points and crossings.



Section and plan of S-G-P transporter trolley as used for out-of-gauge loads comprising steam or diesel locomotives

Motala Diesel Turbine Locomotives

(*Concluded from page* 359)

(*h*) Dynamic braking is inherent in the system and without the addition of any cooling or heat-dissipating elements, as the compressor can be used in reverse as a brake, and the air then compressed by it is simply expelled into the atmosphere.

Standard Designs

Additional to the 1-D-1 and B-B locomotives now running, Motala Verkstad currently has standardised bogie locomotive designs, of which the recent 1,500 h.p. unit is the first, and extending up to 4,000 h.p. The range comprises (*a*) the B-B 62-ton 1,500 h.p. single-plant locomotive of "road switcher" form already running, of 46 ft. 1½ in. length over headstocks and 15/15½ tons axle load; (*b*) a similar 1,500 h.p. unit but with a driving cab at each end, and of 16 tons axle load; (*c*) a B-B 70-ton 2,000 h.p. single-plant locomotive, also 46 ft. 1½ in. long, and under 18 tons maximum axle load; (*d*) a B-B double-plant 80-ton 3,000 h.p. B-B unit, 59 ft. long over headstocks and of 20 tons axle load; (*e*) a C-C double-plant 103-ton unit of 4,000 h.p., 60 ft. 8 in. long and of 17½ tons axle load. All these standards are for a top speed of 75 m.p.h.

URUGUAYAN STATE RAILWAYS TENDERING ARRANGEMENTS.—The Uruguayan State Railways (A.F.E.) has published a public notice advising suppliers of railway material who are interested in tendering for railway contracts and are willing to offer terms of finance or deferred payment terms that if they have not already acquainted the A.F.E. to this effect, they should do so by what is referred to as a letter of intent to be received by the General Management by September 30, 1960. For further information they should apply to the Secretariat of the General Management of A.F.E., calle La Paz 1095, p.2. This present call to register their letter of intent in no way compromises the future decisions to be taken by A.F.E. The British Embassy at Montevideo has reported that the contracts in question will be the subject of restrictive tendering and that firms who do not indicate their willingness to offer finance or deferred payment will be excluded from tendering. Letters of intent should also be accompanied by a note or memorandum providing information about the financial position, ability to arrange finance, and experience and history as suppliers of railway equipment of the firm concerned. Mention should be made of any previous dealings with A.F.E.

Driverless Platform Trucks for Goods Depot

Electronically guided battery vehicles at Wolverhampton Herbert Street, Western Region, following energised under-floor wire

Removing loaded trolley at cartage berth

THE mechanical handling scheme for sundries traffic at the Wolverhampton Herbert Street Goods Depot of the Western Region, British Railways, involving use of electronically-controlled driverless trucks, known as Robotugs, is the result of two years' study and experiment by British Railways and E.M.I. Electronics Limited. Experience was gained with an installation in the goods shed at Newton Abbot, in the Western Region. This was described briefly in our April 24, 1959, issue. Two Robotugs were used.

In the pilot installation at Wolverhampton five Robotugs are in use. Walking by the staff has been eliminated, and there are no fixed tracks or conveyors to impede the free movement of vehicles or staff along the platforms. Sorting is carried out as packages are removed from wagons and the loaded trolleys then automatically delivered to the correct delivery station of the cartage berth.

Each Robotug hauls six trolleys, stopping at each station of the cartage berth, which has been selected by the despatcher, for uncoupling a loaded trolley. Empty trolleys are attached, and the tug returns to the despatcher.

The tug moves at 2 m.p.h. It is accurately guided along its path by a signal wire laid ½ in. below the platform surface. Each of the several tug routes is divided into sections and block working is used as in normal railway practice to prevent a tug entering a section already occupied. Re-starting is automatic as the section is cleared.

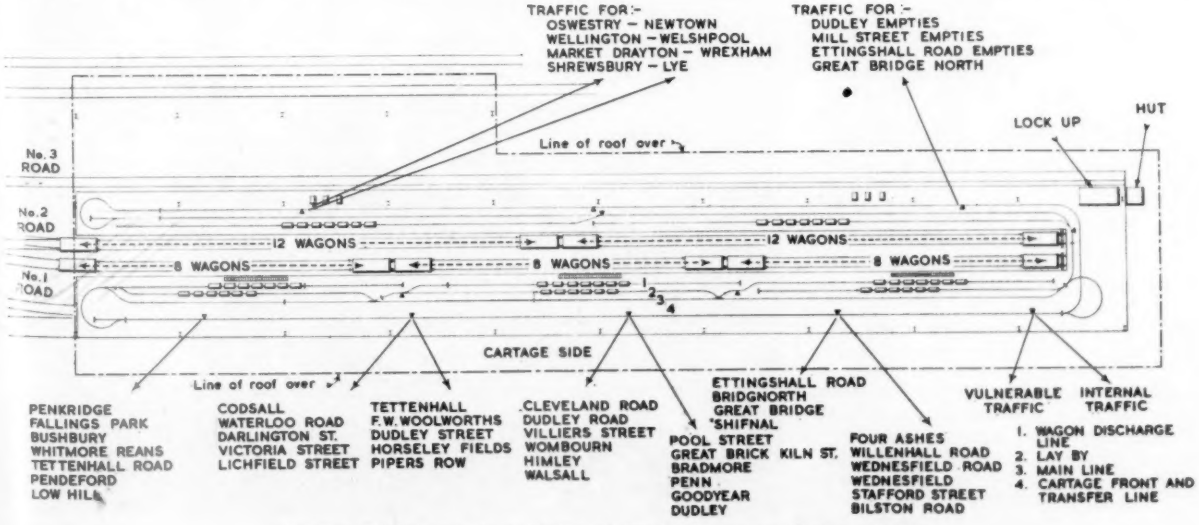
At the Herbert Street depot the daily average discharge rate is 16 tons, covering about 5,000 packages. The shed accommodates 74 wagons on three roads. Roads 1 and 2, which are used for inwards wagon discharge, accommodate 48 wagons. The cartage berth accommodates 60 road vehicles and the number of wagons discharged daily is about 86. Local, zonal and other deliveries are shown on the diagram.

Operating Procedure

The two platforms cover an area of 2,415 sq. yd. On each platform there are four tug tracks. These are: a wagon discharge line, lay-by, main line, and cartage, post and transhipment line. The platforms are divided into three sections of eight wagons each on No. 1 road and two sections of 12 wagons each on No. 2 road. Each of the five gangs is equipped with a Robotug, 12 trolleys, and a 25-ft. length of light-weight moveable rollers.

On the track layout are 12 programmed stops. Five of these are homing stops for the tugs at the trolley loading stations and four are at the cartage berth. Porters discharge from the wagons on to the roller-top stand, where the checker sorts the trolley loads for the respective cartage and transfer stops.

The switches on the programme unit of the tug are selected in accordance with the trolley loading, and the tug despatched. At the cartage or transfer stations the checker releases the auto-



Layout of Robotug installation at Wolverhampton Herbert Street

Tug and trolleys on main track passing trolleys in cartage berth

matic coupling of the trolleys to be detached, replaces these with empties, and re-starts the tug. In the case of suitable unit loads the trolleys are wheeled direct on to the road cartage vehicle and taken by road and unloaded at the consignee's premises.

At the end of the cartage line is a loop in the track. If all programmed stops have been cleared before this point, the tug is by-passed by the loop back to its homing station, without completing a circuit of No. 2 road platform. At the homing station empty trolleys are parked in the lay-by section for use as required. Unloading of wagons and sorting and checking of consignments proceed at the roller-top stand while the loaded tug is in transit.

Electronic Control of Robotug

The Conveyancer—E.M.I. Robotug is a three-wheel battery electric truck of conventional type with power-controlled steering. The turntable of the driving motor, mounted over the single traction and steering wheel, is connected by a chain reduction gear to the servo steering motor. Battery capacity suffices for a normal 8-hr. shift, with the truck operating at 2 m.p.h. At the leading end is an apron carried on four springs. Immediately this touches an obstruction the truck is stopped. The side skirts are brought well down to floor level to deflect loose obstructions.

Guiding Wire

The underfloor guiding wire carries an a.c. current flow of 1/6 A. This is detected by two sensing coils carried at floor level on the front of the truck. In the correct travel position the induced current in each coil is the same and the servo steering motor remains stationary.

When the truck tends to leave the track of the wire, the coil current becomes unbalanced. Working through a relay, the servo steering motor is energised in the required direction to restore the correct tracking of the truck. If the truck leaves the track, or the signal current fails, the driving motor is stopped and the brakes are applied.

Programming Unit

The electronic programming unit is contained in a small removable panel with plug-in connections. Transistors are used in the electronic control circuits. A wall-mounted indicator at the loading point indicates to the checker the station position of the tug on the track circuit.

A steering handle is carried on each tug. If required, the tugs may be controlled by a pedestrian operator or by one riding on the truck for point-to-point working either inside or outside the track circuit area.

Much experiment has been undertaken in the design and selection of the most suitable trailer, as the number required forms a large part of the capital outlay involved. A small turning circle was an essential requirement, but track steering to obtain this was considered to be too expensive. The design adopted incorporates twin castor wheels at the trailing end and a sliding towbar at the fixed-wheel end.

Suitability for Narrow Platforms

This arrangement is stated to have produced very satisfactory tracking and a turning circle diameter of tug and trailers of only 12 ft. 6 in., making the installation suitable for narrow platforms. The advantages of the spring-loaded sliding towbar are that the trolleys close up to the minimum overall length. This reduces walking by the staff at the loading section, and the motor and battery loads are greatly reduced by the gradual take-up of load when starting. Danger to staff is minimised because there are no gaps between the trolleys. Coupling is automatic when the trolleys are pushed together.

This scheme can be varied to suit fluctuations in traffic. Automatic operation of the trucks is considered to be safer than manual operation and maintenance is expected to be less. Despatch errors and split loads should be reduced by the elimination of intermediate handling and checking.

PHILIPS ELECTRICAL LIMITED EXHIBITS AT A.P.L.E. EXHIBITION.—At the A.P.L.E. exhibition for 1960, Philips Electrical Limited will show their complete range of integral sodium lamps, ranging from 45W to 200W. The latter have an average output of 20,000 lumens. The seven ratings, from 50W to 1,000W, of the mercury fluorescent lamp, MBF/U, floodlighting fittings for high-wattage G.L.S. lamps and for discharge lamps, and the 150W pressed glass reflector lamp, are also displayed.

Small turning circle of Robotug and trailer trolleys

ELECTRIC RAILWAY TRACTION SECTION

Traction Motors and their Drives

INDUSTRIAL-FREQUENCY electrification has done many things in the railway world. Perhaps one of the most important has been to make people think; and among the lesser subjects of thought has been traction motors. There has been considerable advance in the design and performance of traction motors for a.c. 50-cycle electric motive power in the 10 years or so since the French got down to the Aix-Annecy-La Roche sur Foron conversion; and many improvements in traction motors generally are due to the impetus to electrification as a whole which has been given by the industrial-frequency system.

Looking back over the history of traction motors it is a far cry, much longer than its 60 years, to the days when locomotive motors were unsprung and the axle itself formed the armature shaft. One tends to wonder today how the New York Central, Milwaukee and other railroads ever got away with it for a month, let alone for several years, particularly as nose-suspended motors were in being.

Throughout the years the drive from motor to axle or wheel has been probably the most important single factor influencing traction motor design once the general electrification system was settled for any particular scheme, at least as far as locomotives have been concerned. With multiple-unit trains matters have always been simpler, for the nose-suspended motor fitted like a kernel in a nut into the general conception which arose from Sprague's development of multiple-unit control, though there have been one or two train units built with rod drive, but none has been placed in service within recent memory.

Adaptation of rod systems to the drives between motors and wheels, from one or two large motors, developed almost naturally from the early adoption of three-phase and low-periodicity single-phase conversions, but came to a head with the early Loetschberg E-type locomotives and their startling vibrations. Then it was that engineers began to realise the forces in such rods were very different in nature and in magnitude from what they were in steam locomotive coupling and connecting rod systems, where the reciprocating piston and valve gear system had a happy knack of combining with the rod system to ensure that undue loads were not applied at dead centres and the awkward 45-deg. change-over points. The immediate result was the development of more complicated rod systems, such as the Bianchi, which obviated some of the worst points at the expense of complexity. However, even before that time the beginnings of resilient individual axle drives were to be seen on some railways.

One might even say the beginnings went back to the first spring drives, such as that proposed by A.E.G. in 1901. But increased outputs needed after the first war led to such methods as the Büchli-Brown Boveri and A.E.G.-Kleinow, though such advance did not preclude the construction of rod-drive systems, which perhaps reached their zenith in those Bergmann 2-C-2 locomotives of the mid-twenties in Germany whose single 2,500-h.p. motor was so enormous that it extended above the normal cab roof level to the confines of the 14-ft. loading gauge.

More elegant systems increased in their applications as express electric locomotives developed, not only for a.c. systems, but also for d.c., as in the G.I.P. 2-Co-2 and 2-Co-1 locomotives of 1926-27 and the early Italian 3,000-V. d.c. locomotives. But this subject and that period provided one of the happiest hunting-grounds for inventors, and well over a hundred methods must have been patented and a large proportion of that total tried, even if only once. At that time, 30 to 35 years ago, a number of express locomotives, such as the G.I.P. units, were built on rigid frames to what were essentially steam-locomotive axle arrangements; and it was really traction-motor design advances which eventually permitted the adoption of the simpler Bo-Bo and Co-Co types, after which the main work was the improvement of bogie design to suit such wheel arrangements to high speeds. That development was not achieved in a year, and powerful express types had to go through intermediate stages as exemplified by the P.L.M. 2-Co-Co-2 class of 4,000 h.p. maximum output. Today bogie and motors are combined even more closely; indeed, in the new Alsthom B-B locomotives of S.N.C.F. class " 16500 " (50-cycle single-phase) they *are* one, because here one large motor is used per bogie and the two axles driven through gears, motor carcase, gear housing and bogie frame being in one structure built to fine, but strictly interchangeable, limits. Such a construction is not accepted by all as something to be desired, or even contemplated, but it has one traffic advantage in that it eases the weight-transfer problems which can be such a practical nuisance in Bo-Bo or Co-Co types with nose-suspended motors; and it is not impossible that this reduced effect plus the prevalance of multi-notch controls with many notches in the starting range are responsible for the high factors of adhesion which are now found to be practicable in daily working.

Ambitious Plans in U.S.S.R.

ABSENCE of tunnels and overline bridges, except in central Siberia and a few other regions, is one reason for the rapidity with which electrification of the U.S.S.R. Railways has been carried out and is planned. At present some 8,500 route-miles are electrified in Russia, in Europe and Asia, some at 3,000V. d.c., and more recent conversion at 25 kV., a.c., 50 cycles.; the latter system is now standard. It is intended that by 1965 a total of over 18,500 route-miles, or 10,000 more than the present total shall have been converted. This will include the 400-mile main line from Moscow to Leningrad and the western portion of the Trans-Siberian route, the 3,375 miles from Moscow to Lake Baikal, work on which is due for completion in the near future. If this object is achieved, 36 per cent of all traffic in the U.S.S.R. will be electrically hauled in 1965, 41 per cent (44,000 route-miles) diesel hauled, and the rest (21,000 route-miles) will continue to be worked by steam.

Conversion of the whole of the 6,000 miles of the Trans-Siberian line to Vladivostock, on the Pacific, is due for completion by 1971. The announcement by the U.S.S.R. Railways that it is intended ultimately to electrify the whole system is hard to understand—unless it is intended in due course, after improvement of the road system, to close some less remunerative branch lines in areas which are remote from electric power supplies.

The pace of conversion in any case will have to be considerable. The greatest potential obstacle would seem to be delivery of special a.c. equipment, but account has been taken of the capacity of the electrical industry—in Russia and in other communist countries. It is not intended in the foreseeable future to convert the 3,000V. lines to 25 kV., and the possibilities of dual-voltage motive power are being investigated. Some progress in this sphere is being achieved in Central and Western Europe, notably in the attempt to design electric motive power for trains working routes electrified successively at two, three or even four voltages, as between Holland and Switzerland. The Russian problem of two voltages is much less complex.

A major difficulty of the U.S.S.R. railways may be that of maintaining a.c. electrical equipment on the ground in the very low winter temperatures of Siberia; it will be interesting to hear more of this when greater experience has been gained with a.c. working on the Trans-Siberian.

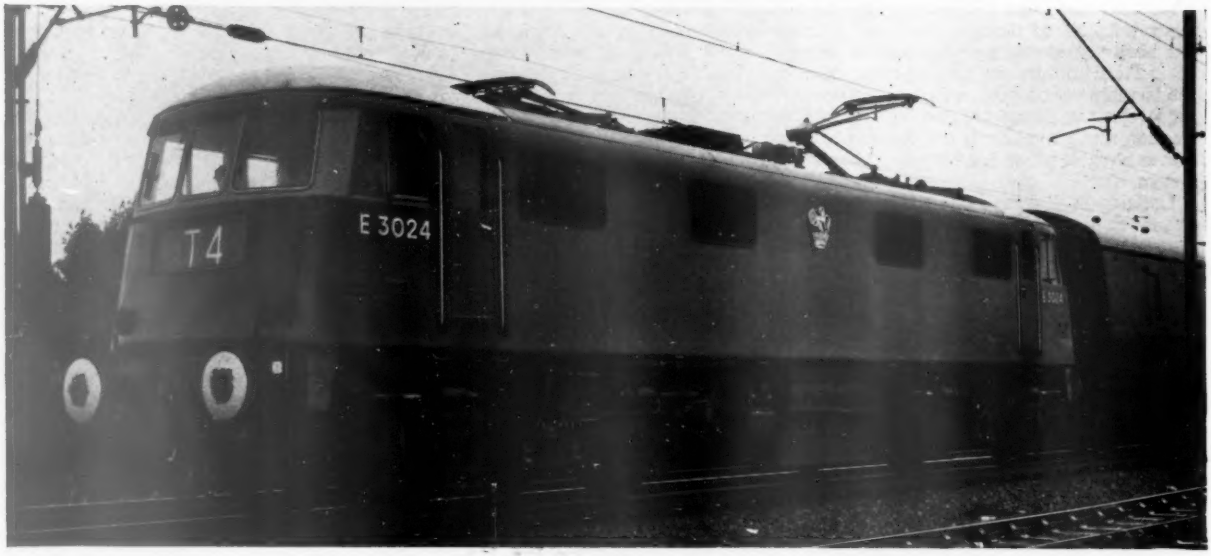
One result of this large-scale electrification will be acceleration. How far higher passenger and goods train speeds are considered commercially desirable by the Russians is not known. Faster schedules will reduce motive power and vehicle turn-round. The fact that, with much of the route already electrified, the fastest passenger train timing between Moscow and Vladivostock is now considerably quicker than before 1914 or in the 1930's indicates that much higher speeds may be expected.

A great deal is bound to depend on efficiency of operation. Much delay, even on double-line sections, appears at present to be caused by poor operating, and recovery margins are reported to be large.

E

British Railways High-voltage A.C. Locomotives

Locomotives built by the English Electric Co. Ltd. for operation on the London Midland Region 25-kV. a.c. electrified lines



English Electric Co. Ltd. 3,300-h.p. a.c. electric locomotive

THE English Electric Co. Ltd. is supplying 15 complete 3,300-h.p. a.c. electric locomotives for operation on the London-Crewe-Manchester and Liverpool lines of British Railways, London Midland Region. The first of these locomotives is already in operation on the Manchester-Crewe section of the line which was officially opened by the Minister of Transport on September 12.

The locomotives, 12 Type "A" and three Type "B," have a Bo-Bo wheel arrangement, two driving cabs, and are equipped for dual-voltage operation, either at 25 kV. or 6·25 kV.

Leading particulars are as follow:—

Weight in working order	73 tons
Maximum axle load	18·4 ,,
Weight of electrical equipment	37 ,,
Weight of mechanical parts	36 ,,
Wheel arrangement	Bo-Bo
Gear ratio (Type "A")	76/25
Gear ratio (Type "B")	76/20
Designed accelerating tractive effort (average)	40,000 lb.
Continuous rated tractive effort (full field)	20,000 lb. at 55 m.p.h.
Continuous rated power (at wheel tread)	2,950 h.p.
Maximum service speed (Type "A") ...	100 m.p.h.
Maximum service speed (Type "B") ...	80 m.p.h.

Current is collected by either of the two pantographs and feeds the primary winding of the transformer through an air-blast circuit breaker and a supply change-over switch; this switch connects the four equal sections of the primary in series for 25 kV. operation or in parallel for 6·25 kV. operation. The operation of the supply change-over switch is automatically controlled by voltage detecting relays on the locomotive.

The ignitron rectifiers are connected in two three-wire bridge groups and the two traction motors of each bogie are permanently connected in series across a bridge. The centre points of the motor circuits are connected to the centre point of the transformer secondary, thereby connecting the motors effectively in parallel, making them less sensitive to wheel slip.

On-load Tap-changing

Locomotive speed control is by on-load tap-changing on the transformer secondary; cam operated contacts are used to select the tappings and electro-pneumatic contactors are used for making or breaking the circuits. In addition, a further stage of speed control is effected by weakening the fields of the traction motors by field tapping, so that there is a total of 40 economical running notches.

A smoothing reactor is arranged in series with each motor to reduce the current ripple. Four ammeters, one associated with each motor, are mounted in the driving cab and indicate any irregular operation of the ignitrons as well as indicating wheel slip.

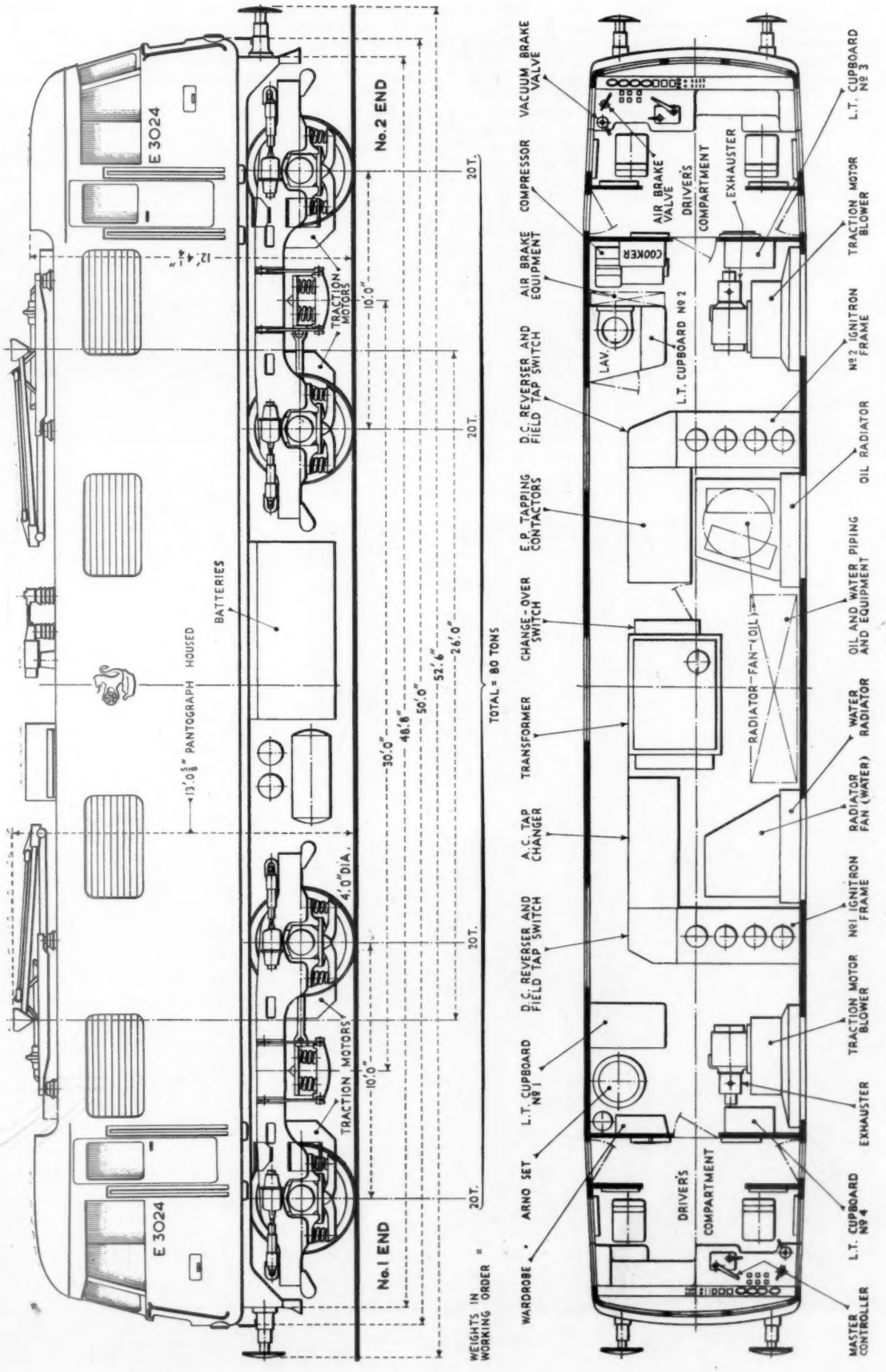
The main transformer has an additional winding for train heating and another winding for the auxiliary supplies. The main and auxiliary compressors and the two exhausters are driven by d.c. machines; the remainder of the auxiliary equipment is driven by three-phase a.c. induction motors which run at a sensibly constant speed independent of the line voltage. The three-phase supply is obtained from an Arno convertor, which is mechanically coupled to a d.c. generator and a small tachometer alternator. The battery is used to run the Arno convertor, which is mechanically coupled to a d.c. generator as a motor. At the appropriate speed, the tachometer alternator causes the single-phase supply to be switched on to the Arno and opens the d.c. starting contactor. The Arno convertor then drives the d.c. generator which is automatically connected to charge the battery.

In addition to the d.c. machines already mentioned, six a.c. auxiliary machines are fitted, and these are driven from the three-phase, 50-cycle a.c. supply provided by the Arno convertor. These machines comprise one radiator fan motor for the oil circuit; one radiator fan motor for the water circuit; one oil pump motor; one water pump motor; and two blower motors for the traction motors.

Transformer Cooling

The shell type main transformer is forced-oil cooled, the oil being cooled in a separate blown radiator. The core is built up of grain-orientated steel and is clamped without through bolts. The lower part of the transformer tank forms a support for the core and windings; the upper part carries epoxy-resin moulded secondary terminal blocks, the h.t. bushing, and various fittings. A gas-actuated (Bucholz) protective relay is fitted, specially designed for traction service.

On the locomotive, there are two rectifier cubicles each containing four sealed ignitrons connected as a bridge circuit. Each pair of ignitrons in effect feeds one traction motor. The ignitrons are water-cooled units, the vacuum vessel being of stainless steel. A water jacket with spiral guides surrounds the vacuum vessel and the cathode block is also water cooled. The cooling water is pumped from the rectifiers through a fan-cooled



Elevation and plan of locomotive, showing principal dimensions and general arrangement of equipment

radiator and thence to a manifold which contains water heaters. Thermostats in the manifold ensure that the water heaters are switched on and load application is prevented until the correct operating temperature is achieved; thereafter, the water temperature is automatically controlled by a by-pass thermostat across the radiator.

The four traction motors are four-pole d.c. machines which drive the road wheels through S.L.M. resilient drives, the motors being fully spring mounted. Class " H " insulation is used for both the armature and field windings, and the motors are forced ventilated. A single stage of field weakening is obtained by field tapping.

Design of Mechanical Parts

In designing the mechanical parts of the locomotive it became apparent that orthodox construction would not meet the required strength to weight ratio nor permit compliance with other specified requirements. These requirements include the accommodation of a 200-ton buffing load within the elastic limit of all materials, a 48 in. wheel diameter, gangways through the locomotive of not less than 5 ft. 10 in. in height, compliance with the restricted British Railways loading gauge, adequte clearance to earth from high-voltage equipment, and so on.

The locomotive frame and body is fabricated as a unit stress-bearing structure in Cor-tan steel. The underframe is a shallow cellular construction of light-gauge members and the whole is plated top and bottom to form a closed unit; high vertical, logitudinal and torsional rigidity is thus obtained. The body-side frames are of girder design and both exterior and interior skins are fitted to promote maximum torsional rigidity to the underframe and side frame structure. The roof in between the two cabs can be removed completely to permit the installation of electrical equipment; this precludes structural ties between the side frames and adds to the importance of making the side frames very rigid.

The bogies are designed for minimum maintenance; all the operating gear is arranged externally for ease of inspection. Special care has been given to promote good riding of the locomotive by fitting long-range spring gear, swing bolsters, and close guiding of wheel and axle sets. The superstructure is metallically insulated from the bogies by rubber at the centre pivots, side bearers, and traction links.

To eliminate hunting of the bogies, a proportion of the vertical load from the superstructure is transmitted through side bearers. Periodic movements of the swing bolsters are restrained by hydraulic dampers. The more usual friction plates in the bolster are dispensed with, the braking and traction thrusts being transmitted by two links between the bogie frame and bolster. To cater for compound movements, the links are fitted with rubber bonded brushes at each end.

The bogie side frames, transoms, and headstocks are of fabricated box-section construction and are riveted together. A short equalising spring beam is pin-jointed to the underside of each roller bearing axlebox and the primary coil springs rest in cups attached to the beam; hydraulic dampers are fitted inside the springs.

Brake Equipment

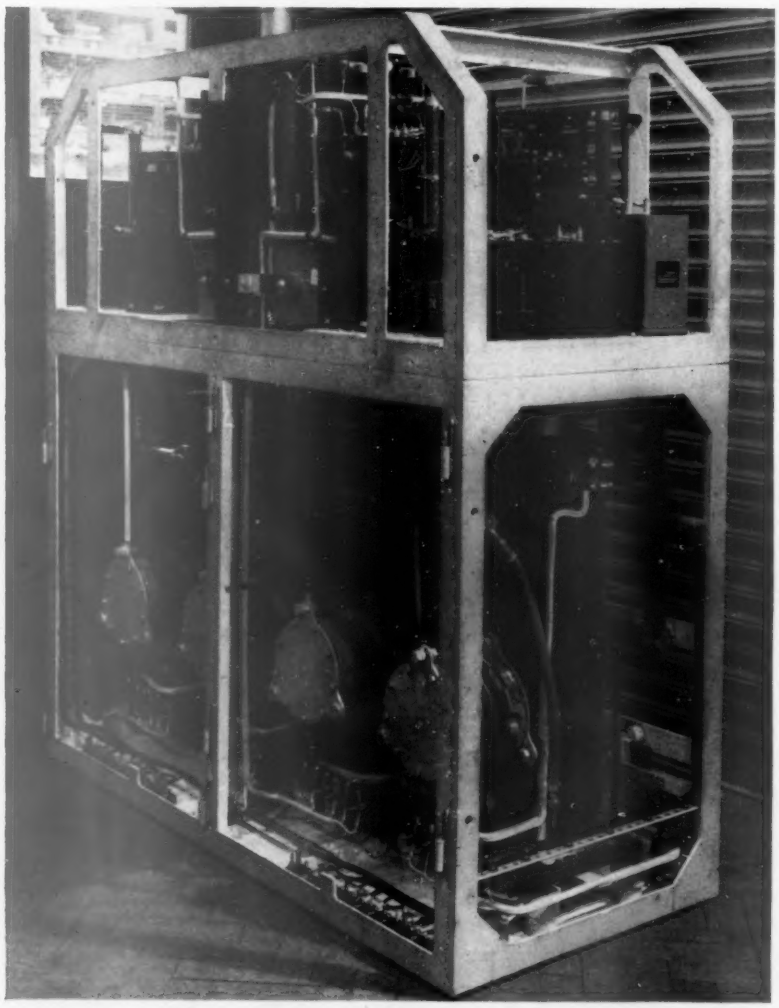
The locomotive is equipped with both independent and proportional air brakes, and provision is made for hauling vacuum fitted stock. An individual brake cylinder is fitted at each wheel and operates on the blocks by a system of levers and rods; automatic slack adjusters are also installed.

One of the 15 locomotives is being equipped with air-cooled silicon rectifiers, and in addition rheostatic braking and a notchless form of control gear employing transductors is used.

The locomotives have been designed to the requirements of the British Transport Commission under the general direction of Mr. S. B. Warder and Mr. J. F. Harrison, Chief Electrical Engineer and Chief Mechanical Engineer respectively of British Railways Central Staff.

The principal sub-contractors are as follow:—

Radiators	Marston Excellsior Limited
Traction motor blowers	Aerex Limited
Battery	Nife Batteries Limited
Main compressors and brake equipment	Worthington-Simpson Limited
Auxiliary compressors ...	Westinghouse Brake & Signal Co. Ltd.
Exhausters	Consolidated Brake & Engineering Co. Ltd.
Buffers	Oleo Pneumatics Limited
Axleboxes	Skef'ko Ball Bearing Co. Ltd.
Windows	Beckett Laycock & Watkinson Limited
Pantographs	J. Stone & Co. (Deptford) Ltd.
Air-blast circuit breakers	Brown-Boveri & Co. Ltd.
Cable	British Insulated Callenders Cables Limited

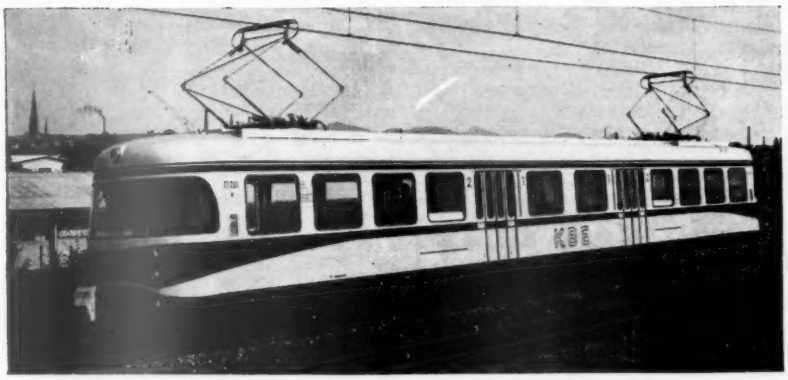


Four ignitrons and auxiliaries in one of the locomotive's two frames

NORTHERN ALUMINIUM CO. LTD. CHANGE OF NAME.—The Northern Aluminium Co. Ltd. has changed its name to Alcan Industries Limited. This new name involves no change of ownership, manufacturing activity or sales policy. Its purpose is simply to identify the company clearly as a member of the Aluminium Limited of Canada enterprise. Aluminium Limited, with headquarters in Canada, is the world's largest producer of aluminium for international trade, accounting for one-fifth of the free world primary production.

Inter-Urban High-Speed Electric Vehicles

Lightweight motor-coaches for short-distance traffic



Light-alloy motor-coach of 405 *b.h.p. and* 29·5 *ton for* 18*-mile service*

ONE of the most modern electric motor-coaches for fast short-distance inter-urban service is that introduced recently as a prototype on the Köln-Bonner Eisenbahn, in Germany. At the moment, it is working in with other services, after numerous trials on accelerated timings; but another nine cars are projected, and when these are in service they will be used to give a frequent non-stop service between Köln and Bonn, 17·6 miles, in about 25 min., including the slow passage down the quays at Köln, and dovetailing in with the present stopping and fast services. The present fastest services take 32 to 35 min. inclusive of five brief intermediate stops along the Köln quays and at Bonn West. These new motor-coaches are to be used solo or in multiple-unit, and will not haul trailers.

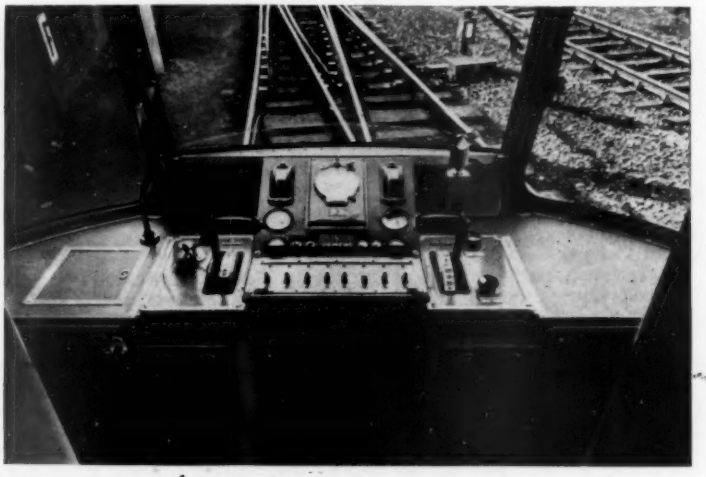
The principal feature of this new motor-coach, built by the Westwaggon Division of Klöckner-Humboldt-Deutz, is the extensive use of aluminium alloy. The two bogies, all axles of which are driven, are of a modified Minden-Deutz type, with four hydraulic dampers on each bogie and with rubber springs above each SKF axlebox. The bolster has spiral springs, and the body rests on the bolsters through rubber supports on sliding steel plates having graphite lubrication. Side links are used to transmit traction and braking forces between bogie and body. The wheels are 30 in. in dia. on tread, and are notable in comprising aluminium-alloy wheel centres over which are shrunk steel tyres. Machined weight of a wheel centre is 91 lb. Bogie wheelbase is 7 ft. 3 in., and bogie pivot pitch 53 ft. 4 in. Weight of a bogie complete but without traction motors is 11,600 lb.

Construction of the bogie frame structures is in steel; otherwise the mechanical portion is entirely in light alloy apart from such details as couplers and standard brake fittings. Body length is 77 ft., width over outer panels 8 ft. 10½ in., and roof height above rail level 11 ft. 1 in. Floor level is 29¾ in. above the rail in the centre saloon and raised to 36¾ in. in the end saloons, above the bogies. Body frame and underframe are in the form of an integral structure of Al-Mg-Si-F.32 alloy argon-arc welded, and with side and end panels, roof and floor plates also of aluminium alloy, and attached to the framing by spot-welding and riveting. This 77-ft. structure weights 10,000 lb., of 138 lb. per ft. run. Inner panelling is of plastic, and the seats, on light-alloy frames, and other interior fittings are of a modern and tasteful type. Window frames and interior fittings take a further 1,100 lb. of aluminium alloy.

Interior Accommodation

In the centre of the car, between the two wide entrance vestibules, with double folding doors 5 ft. 6 in. wide, is the first-class saloon with 12 seats arranged two and one on each side of the aisle, and with a back-to-back distance of 6 ft. 6¾ in. The second-class saloons are at the ends and contain a total of 60 seats with a back-to-back distance of 5 ft. 2¾ in. In view of the short distances and travel time no toilet accommodation is provided. There is a full-width driving compartment at each end, and these are entered only from the adjacent passenger saloon.

All windows are fixed. Ventilating air comes in through grilles, two on each side of the car at the doors, and is led



Above: central driving position with main control and braking handles at each side

Left: interior of one of the two second class saloons, with motor-inspection trap in floor

downwards to cylindrical reservoirs in which all major dust particles are deposited and which are cleaned out about once a month. In cold weather the cleaned air is passed over electric heating elements and is led into the passenger saloons at the sides, and goes out through static extractors in the roof. Heating elements are cut in or out under thermostatic control. In hot weather the air flow is in a sense reversed, in that after passing the cylindrical traps it is taken upwards again, enters the saloons at ceiling level, and goes out through the ducts at the bottom of the inner side panels.

Electrical Equipment

Current in the overhead line is 1,200 volts d.c. Power is provided by Siemens-Schuckertwerke electrical equipment, which includes four fully springborne motors with an individual continuous rating of 75 kW. These are grouped first in series, then in series-parallel with full field, and then in series-parallel with 60 per cent field and 40 per cent field. On the one-hour rating they have 600 volts 140 amp. 1,450 r.p.m. and 100 per cent field. Starting current is up to 260 amp. per motor, and normal acceleration rate is up to 3·28 ft. per sec. per sec. Gear ratio is 14: 57. There is a 25-notch control in which the first 13 notches are with series grouping. There are two pantographs, one near each end of the roof, and the single 1,200/110-volt transformer is located below the floor close to one bogie and feeds the control system and the electromagnetic brake. The 48-cell AFA battery is of 96 volts and of 70 amp. hr. capacity at the 14-hr. rate of discharge.

Braking equipment is comprehensive. In addition to the B.S.I.-Knorr compressed-air disc brakes on every wheel, there is a separately excited eddy-current brake, an electromagnetic track brake, and a hand parking brake.

The electrically driven compressor for the air brake and other air supplies is below the floor. Normal braking on the fast schedules is up to 3·28 ft. per sec. per sec., but in emergency braking, with air, electric and electromagnetic braking all on, retardation rates of 7 ft. per sec. per sec. have been reached. On test a stopping distance of 1,425 ft. from 75 m.p.h. has been recorded. The electromagnetic brake can be applied with a force up to 21,000 lb. per shoe. A Knorr type of deadman equipment with a 4 sec. delay is incorporated in the main control system.

Top designed speed of this motor-coach is 75 m.p.h.; and though intended particularly to provide the accelerated Köln-Bonn non-stop service, the electrical equipment and braking system were designed also to give a start-to-stop speed of 35 m.p.h. with a distance of 1·37 miles between stops. Measured accelerations on test have been from rest to 52 m.p.h. in 25/26 sec. and to 75 m.p.h. in 120 sec. Empty weight is 66,000 lb. (29·5 tons), and gross weight with all seats occupied and a number of standing passengers is about 37 tons, giving 10·6 h.p. per ton of fully laden weight and 13·65 h.p. per ton of empty weight.

Boston Branch Railway Converted to Rapid-transit Line

Twelve-fold traffic increase in three months: replacement of diesel by electric traction

IN an editorial article in our issue of November 27, 1959, brief mention was made of the taking over by the Boston Metropolitan Transit Authority of a 9½-mile suburban branch of the Boston & Albany Railroad for conversion as a rapid-transit line. In this, as in many other, instances, the rapid-transit line is what would be termed in this country a tramway, with one or more tramcars running together as trains not on grooved rails in roadways, but on railway-type permanent way on its own formation. The success of this policy as providing much-needed convenience for outer-suburban passengers and also financially would seem to be proved by the following facts.

The branch line concerned was known as the Highland Branch of the B. & A. RR. and ran westwards from the heart of the city *via* Brookline to Riverside at the western boundary of the suburb of Newton. Even with diesel traction this 9·4-mile branch was able to carry all the traffic then offering in two morning trains into and two evening trains out of the city daily; the number of passengers seldom exceeded 2,000 on any one day, and hence its closure as unremunerative.

Works Involved

On purchasing the line the Boston M.T.A. let a contract valued at about £2,140,000 for the principal works involved in its conversion as an electrically-worked rapid-transit concern, and it was recently reopened as such.

The most difficult work involved in the conversion was the construction of a tunnel connection between the B. & A. RR. tracks and the M.T.A. system in the city. It was complicated by the proximity of streets and buildings requiring precision work, the careful movement of machines and studied co-ordination of material supplies. Much of the delicate break-through tunnelling was done between midnight and 5 a.m. when there were no trains and little other traffic moving.

Other works necessary were formation drainage measures, the provision of (*a*) stone ballast for some 2½ route-miles of line and of (*b*) 27,000 new sleepers. Moreover, 25,000 ft. of track had to be rerailed to replace hogged and worn rails, and 11 of the old stations were demolished and replaced by small shelters. The cost of the rehabilitation works was estimated to be only 45 per cent of what complete rebuilding would have totalled.

Some of the principal items of expenditure were:

	£
General construction works	1,100,000
Trackwork	480,000
Electric installation	400,000
Entirely new signalling	200,000

Total expenditure on all accounts amounted to roughly £3,000,000.

Traffic Increase

So popular did the conversion prove that only some three months after its completion, 25,000 passengers were being carried daily and a considerable further increase was expected during the winter for reasons given below. It is noteworthy that a reduction of 30 per cent in fares as compared with those charged by the railway contributed to this 12-fold increase in traffic. It is considered that when the average number of passengers reaches 35,000 a day the expenditure on conversion will have been justified. Important advantages accruing are the ability of commuters and other passengers to travel directly from the suburbs to many of Boston's business houses, stores and other buildings in the centre of the city without change of vehicle and under cover, a special attraction in winter.

Service Frequency and Speed

Most attractive, however, are the frequency of the service and speed of the trains composed of up to three cars run at 5½-min. intervals at busy times of day and 12-min. at slack periods and week-days. When road traffic is dense it may take 1½ hr. to travel by motorcar from Riverside to the city centre; the rapid-transit trains take 38 min. Moreover, the great increase in traffic is appreciably reducing the number of motorcars on the streets of Boston. On the other hand, ample parking is now provided at the outer stations or halts with all-day charges lower than those in the city.

There is, therefore, no comparison between the widespread facilities now provided and those formerly available, and there seems little doubt that the increasing response of the public will insure that the outlay involved will have been amply justified before long.

INTERNATIONAL COUNCIL OF TRAVEL AGENTS.—At a meeting of the International Council of Travel Agents on September 8, it was agreed that the Council should convene a meeting of all international associations of travel agents and similar bodies, to be held in the early part of 1961.

RAILWAY NEWS SECTION

PERSONAL

Mr. S. D. M. Robertson, General Manager & Port Authority, Sierra Leone Government Railway, is at present on leave in the United Kingdom.

Mr. Derrick Charles Brown, Chief Mechanical Engineer, Crown Agents for Oversea Governments & Administrations who, as recorded in our March 11 issue, has been elected President of the Institution of Locomotive Engineers, served his apprenticeship at the Stratford Works of the Great Eastern Railway. He studied mechanical and electrical engineering at Queen Mary College (then East London College), University of London, and holds the degree of B.Sc.(Eng.) In 1924 Mr. Brown was appointed Personal Assistant to the late Mr. W. A. Lelean, Chief of the Locomotive Department of Messrs. Rendel, Palmer & Tritton, Consulting Engineers. He joined the Crown Agents for the Colonies in 1930 as an Engineering Assistant in the Department dealing with the design of locomotives, carriages and wagons. In 1940 he was seconded to the Ministry of Supply as a Senior Design Officer in the Department of Tank Design, Chobham, where he remained until 1945. Shortly after his return to the Crown Agents he was appointed Deputy Chief Engineer, Engineering Inspection Department, and, in 1950, was appointed Deputy Chief Mechanical Engineer. During the course of his duties he visited, in 1950, Hong Kong, Malaya, Singapore, North Borneo, Brunei, Sarawak and Ceylon. In 1955 he visited Iraq, Persia and Jordan, He is a Member of the Institution of Mechanical Engineers, an Associate Member of the Institution of Civil Engineers, and a Member of the Institute of Welding.

Mr. D. C. Brown
President of the Institution of Locomotive Engineers, 1960-61

Mr. S. H. Wadhwa
Appointed General Manager, South Eastern Railway of India

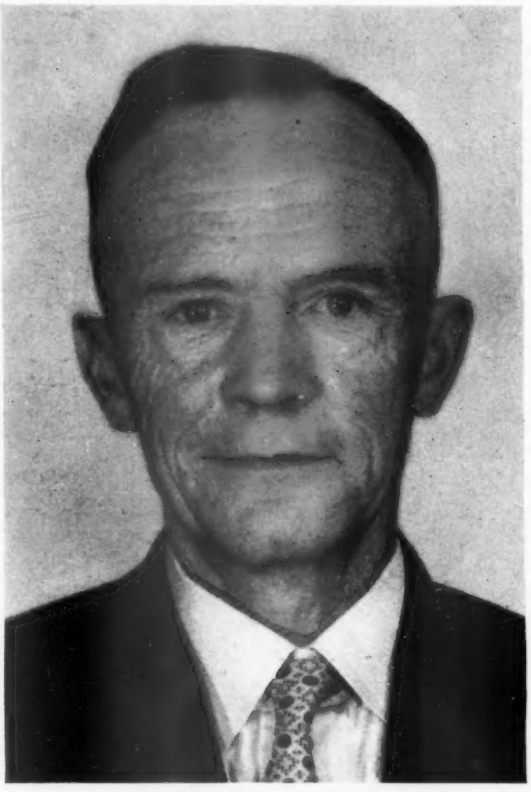
We regret to record the death of Sir Arthur Fleming, former President of the Institution of Electrical Engineers, who was born in Newport, Isle of Wight, in 1881, and educated at Finsbury Technical College under Sylvanus Thompson. In 1900 he was one of a group of young engineers who were sent to the American Westinghouse Company in Pittsburgh for training and returned as a nucleus of staff for the British Westinghouse Company, later redesignated the Metropolitan Vickers Electrical Co. Ltd. in Trafford Park, Manchester. Fleming occupied an ascending series of positions in this company, and finally became Director of Research & Education. Except for connections with other associated companies, his whole professional career lay in the one company. He occupied the chair of a series of professional associations, being President of the Institution of Electrical Engineers in 1938-39, and President of the Engineering and Education sections of the British Association in 1939 and 1949 respectively. He was made C.B.E. in 1920 and knighted in 1945.

Mr. S. H. Wadhwa, Chief Engineer, South Eastern Railway of India, who, as recorded in our July 15 issue, has been appointed General Manager of that railway, was born in 1906. He joined the East Indian Railway in 1931 as a probationer in the Indian Railway Service of Engineers. In 1934 he was appointed Assistant Executive Engineer. After service on the Main and Howrah/Burdwan Chord lines he was promoted to be Executive Engineer (Senior Scale) in 1944. He was appointed Deputy Chief Engineer in June, 1949, and in August, 1951, he became Divisional Superintendent, Howrah, and later that year worked as Engineer-in-Charge of Construction of the 52-mile long broad gauge line from Chunar to Churk. In July, 1955, he was transferred to Dinapore as Divisional Superintendent, and from Dinapore he returned to the Headquarters of the Eastern Railway in Calcutta as Senior Deputy General Manager. In January, 1958, he became Chief Engineer of that railway but transferred to the South Eastern Railway in January, 1960, with the appointment of Chief Engineer. Mr. Wadhwa was appointed General Manager of the South Eastern Railway on June 22, 1960.

We regret to record the death of Mr. Alexander Eddy, Chief Legal Adviser & Solicitor to the former London Midland & Scottish Railway. Mr. Eddy was born in 1882 and was educated at Bannister Court School, Southampton. In 1898 he was articled to Mr. C. H. Mason, Solicitor to the London & North Western Railway. On qualifying in 1904, he became a member of the Solicitor's staff, and served subsequently under Mr. C. de J. Andrewes, Mr. M. C. Tait, and Mr. H. L. Thornhill. During the

1914-18 war Mr. Eddy served in the R.N.V.R. and while on active service was appointed head of the Parliamentary Department of the L.N.W.R. In 1921 he became Assistant Solicitor to that company and in 1923 to the L.M.S.R. He was appointed Solicitor to the L.M.S.R. in 1927, on Mr. Thornhill's promotion to the position of Chief Legal Adviser. When Mr. Thornhill retired from that position in 1939, Mr. Eddy was appointed to succeed him, and combined the duties of Chief Legal Adviser and Solicitor to the company until his retirement in April, 1945. Mr. Eddy took a prominent part in the important litigation which took place under the Railways (Valuation for Rating) Act, 1930. Editorial reference is made on page 349.

Mr. H. J. Castle
Chief Mechanical Engineer, Rhodesia Railways, 1959-60



Mr. H. I. L. Dolan
Appointed Chief Mechanical Engineer, Rhodesia Railways

Mr. H. J. Castle, Chief Mechanical Engineer, Rhodesian Railways, who, as recorded in our July 29 issue, is retiring, was born at Derby in 1900. After serving for 11 years with the former Midland Railway and with the London, Midland & Scottish Railway, he joined the Rhodesia Railways in 1928, as Technical Assistant (Mechanical). After serving in various grades, and holding acting appointments at Livingstone, Salisbury, Broken Hill and Umtali, he became Progress & Planning Officer in the Mechanical Department, Bulawayo, in 1938. In 1941, Mr. Castle was released for military service, as Progress & Planning Officer to the War Supplies Committee. Later that year he was appointed General Manager, Eritrea Railway, with the rank of major. He was demobilised in 1944 and, shortly afterwards became Mechanical Engineer, Umtali. He became Assistant Chief Mechanical Engineer, Bulawayo, 1955, and was promoted to be Chief Mechanical Engineer in January, 1959.

We regret to record the death of Mr. E. F. C. Trench, formerly Engineer-in-Chief of the former London Midland & Scottish Railway.

We regret to record the death of Mr. D. W. Brisbane, C.B.E. (Chairman), Perth, Midland Railway Co. of Western Australia, Ltd.

INSTITUTION OF LOCOMOTIVE ENGINEERS AWARDS

The following Awards for Papers have been made by the Council of the Institution of Locomotive Engineers:—

The Frederick Harvey Trevithick Award

To Mr. C. F. Ryan (Member) and a *Special Award* to Dr. B. B. Hundy (non-member) for the Paper "Steel Wheels & Tyres."

The Institution of Locomotive Engineers Award

To Prof. Dr.-Ing. R. Roosen (non-Member) for his Paper "The Class '25' Condensing Locomotives on the South African Railways—Design & Operating Experiences."

The Alfred Rosling Bennett Award

To Mr. W. L. Topham (Member) for his Paper "Methods of Reducing Flange-wear on Diesel and Electric Bogie Locomotives."

The Charles S. Lake Award

To Mr. K. P. Brockway (Associate Member) for his Paper "Aluminium Technology and Railway Rolling Stock."

The William Alexander Agnew Award

To Mr. G. E. Scholes (non-Member) for his Paper "The Swindon-built Diesel Hydraulic Locomotive."

The Stewart–Dyer Awards

To Mr. A. Singh (Associate Member) for his Paper "The Choice of Couplers and Draft Gears for Indian Railways."

To Messrs. M. O. Attock (Member) and S. Fletcher (Associate Member) for their Paper "Some Ideas on the Maintenance of Diesel Electric Locomotives."

The Graduates' Award

To Mr. L. S. Thorpe (Graduate) for his Paper "Control Scheme of Diesel-Electric Locomotives Nos. D. 5500—D. 5519."

Mr. H. I. L. Dolan, Assistant Chief Mechanical Engineer, Rhodesia Railways, who, as recorded in our July 29 issue, has been appointed Chief Mechanical Engineer, was born at Durban in August, 1904. He began his railway career as an apprenticed fitter with the South African Railways & Harbours, and came to Bulawayo in January, 1927, when he joined Rhodesia Railways as a Junior Draughtsman. Except for a short period in 1936, when he was Technical Assistant in the Transportation Department, Mr. Dolan has served in the Chief Mechanical Engineer's Department. He became Senior Draughtsman in 1938. During the war years he acted as Progress & Planning Officer, and also as Mechanical Engineer on several occasions. In 1944 he was appointed Progress & Planning Officer at Bulawayo. He was promoted to the position of Mechanical Engineer, Bulawayo in 1947. He acted on numerous occasions as Assistant Chief Mechanical Engineer, and was appointed to this post in 1957. He has also acted as Chief Mechanical Engineer.

Mr. R. M. L. Lemon, B.A., Chief Establishment Officer, East African Railways & Harbours, who has been appointed Chief Operating Superintendent of that system, was educated at Malvern College and

Mr. R. M. L. Lemon
Appointed Chief Operating Superintendent, East African Railways & Harbours

Balliol College, Oxford. He obtained his early transport experience with Pickfords Limited, Hay's Wharf Cartage Co. Ltd., and the London Passenger Transport Board. He joined the Great Western Railway in 1938 and underwent a three-year course of special training in the Traffic Department, serving in various traffic divisions and at headquarters at Paddington. From 1940 to 1946 Mr. Lemon served with the Royal Engineers (Transportation); from 1943 to 1945 he was attached to the Railway Board, Government of India, and, in 1946, was transferred to the Transport Division of the Control Commission for Germany, in the capacity of Deputy Controller (Operating) for the railways in the British Zone. He was demobilised in May, 1946, with the rank of Lt.-Colonel, and rejoined the G.W.R. later in the same year. In 1950 he was appointed Administrative Assistant to the General Manager, East African Railways & Harbours. He became Chief Establishment Officer in 1952, and was appointed Acting Chief Assistant to the General Manager during the absence of Mr. G. P. Mackay, Deputy General Manager, in October, 1954. Mr. Lemon will be visiting this country shortly to attend the British Railways Electrification Conference which begins on October 3.

Mr. A. F. Simpson
Appointed Assistant Chief Mechanical Engineer, Rhodesia Railways

Mr. J. H. Collier-Wright, B.A. Chief Establishment Officer, East African Railways & Harbours, who has been appointed Chief Commercial Superintendent of that system, was born in 1915 and educated at Bradfield College and Queen's College, Oxford. He joined the L.N.E.R. as a traffic apprentice in September, 1936, and received training in the North Eastern Area. After serving in the Army throughout the 1939–45 war, he was demobilised in December, 1945, with the rank of Lt.-Colonel. In March, 1946, he accepted the position of Assistant Superintendent, Kenya & Uganda Railways & Harbours, and was stationed at Nairobi. In November, 1947, he was awarded the American decoration of Legion of Merit (degree of officer), for war services. He was appointed Assistant Chief Commercial Superintendent in 1952. Mr. Collier-Wright filled the position of Chief Commercial Superintendent in an acting capacity from August, 1954, until February, 1955, and was then appointed Chief Establishment Officer.

Mr. H. E. C. de Chassiron has been elected to the board of D. Napier & Son Ltd. a subsidiary of the English Electric Co. Ltd., and is to succeed Mr. H. Sammons as Managing Director with effect from January 1, 1961.

L.T.E. Appointments

The London Transport Executive has announced the following appointments:—

Mr. R. M. Robbins, Secretary and Chief Public Relations Officer, to be Chief Commercial and Public Relations Officer.

Mr. J. D. C. Churchill, Assistant Secretary, to be Planning Officer in the Commercial Department, responsible to Mr. Robbins.

Mr. W. E. G. Hewings, Works Officer, to be Assistant Secretary and Works Officer.

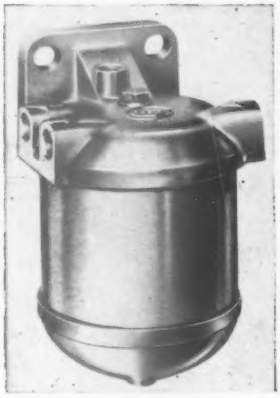
Mr. A. F. Simpson, Diesel Officer, Rhodesia Railways, who, as recorded in our July 29 issue, has been appointed Assistant Chief Mechanical Engineer, was born in June, 1908, at Pretoria. He was apprenticed in 1924 at the Inverurie Workshops of the London & North Eastern Railways in Aberdeenshire. He remained with the L.N.E.R. until 1935, when he left the position of Personal Assistant, Technical, to the Locomotive Running Superintendent for Scotland at Glasgow, to take up the appointment of Assistant Locomotive Superintendent on the Burma Railways. During the following five years he served that administration as Assistant Works Manager, Myitnge Carriage & Wagons Shops; Production Engineer, Insein Locomotive Shops; and Assistant Locomotive Officer, Rangoon District. From 1940 to 1943 he was employed by the Director of War Supplies, Technical, in the Machine Tool Section, Johannesburg, and then as Assistant Manager, Johannesburg Tool Room, Ammunition Section, South African Mint. In 1946 he returned to Burma to assist with the rehabilitation of the railway system which had been largely destroyed during the war. He was appointed District Mechanical Engineer, Mandalay, and finally Locomotive Running Superintendent with Headquarters at Rangoon. In 1950 Mr. Simpson joined the Rhodesia Railways, and has served at Bulawayo, Salisbury, and Umtali. During much of this time he has been in charge of diesel locomotives, and has twice taken charge of the workshops at Bulawayo as Acting Mechanical Engineer. He was chosen by Rhodesia Railways to represent the Administration among a party of engineers which visited Madagascar in February, 1958.

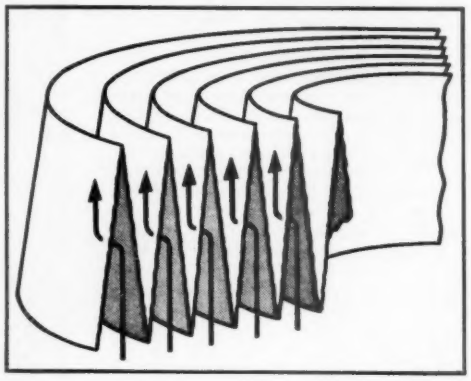
Mr. J. H. Collier-Wright
Appointed Chief Commercial Superintendent, East African Railways & Harbours

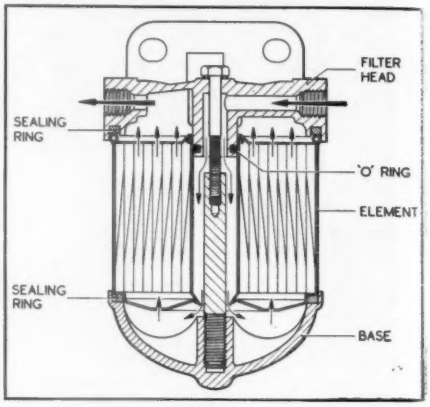
Mr. A. W. Crombie, Mechanical Engineer, Bulawayo, Rhodesia Railways, who, as recorded in our September 2 issue, has been appointed Senior Mechanical Engineer, was born in Bulawayo in February, 1906, and joined Rhodesia Railways in 1922. He became a Junior Draughtsman in 1928 and a Draughtsman two years later. In 1940 Mr. Crombie joined H.M. Forces and was promoted to be Lieutenant Colonel in the Royal Engineers. He resumed duty with the railways in 1946, and in September of that year was promoted to be Acting Progress & Planning Officer, and was confirmed in that position in 1947. Subsequently he acted as Mechanical Engineer at Umtali and Bulawayo, and was promoted to be Mechanical Engineer, Umtali, in August, 1955. He was transferred to the post of Mechanical Engineer, Bulawayo, in 1959.

Mr. A. W. Crombie
Appointed Senior Mechanical Engineer, Rhodesia Railways

NEW EQUIPMENT AND PROCESSES







Fuel-Oil Filter

A BOWL-LESS fuel-oil filter for diesel-engines, the FS type, retains the outstanding filtration characteristics claimed for the C.A.V. F-type, but the omission of the conventional bowl has enabled reductions to be made in the cost, overall size, and weight.

It is constructed as a cross-flow filter with three main components:—

(i) Cast-aluminium filter head which acts as the mounting bracket and incorporates all fuel connections.

(ii) Cast-aluminium filter base fitted with a central stud to accept the centre bolt of the filter head.

(iii) Disposable thin metal canister containing the filter element.

Oil-tight sealing is effected by synthetic-rubber rings located at the upper and lower outer rims of the element. Paper strips forming the element are wound round a cylindrical core in the form of a spiral. The strips are cemented together at top and bottom to form a series of continuous vee-shaped coils. In this way a very large filter area is provided within the minimum canister size. The actual number of turns of paper is much greater than depicted in the simplified diagram (centre). Although it is wound closely it is crêped to allow continuous oil space between adjacent turns.

The paper used for the filter has been selected after exhaustive laboratory and field tests. It is resin treated, of high strength when wet, and provides an extremely high degree of filtration efficiency. The elements have been subjected to tests at high and low temperatures and with severe vibration and pressure without harmful effect. It will be noted that the dirty oil is confined to the undersides of the paper coils, and filtered oil to the upper sides. The filtering area is identical to that of the standard C.A.V. F-type filter element, i.e. about 560 sq. in.

The fuel flows through the inlet connection, down the centre tube of the element into the base cavity, then up through the filter element to the filter head, and out to the injection pump *via* the outlet connection. The dirty side of the filter is sealed from the clean side by an O ring held in a groove in the filter-head casting, over which the centre tube of the element fits. The filter head is available in a number of forms to suit the requirements of various installations. One design for general application is suitable for either the C.A.V. distributor pump or the in-line type pump. It has two inlet and two outlet connections, thus providing for alternative piping arrangements to suit the installations.

Inlet and outlet bores are tapped ½ in. x 20 UNF, and are suitable for either olive-type connections made direct into the head, or banjo bolts and fittings. Air venting from the filter is by an additional orifice in the filter head, tapped ⅜ in. UNF, to which may be fitted a vent plug or continuous bleed as required. A rigid vertical flange with two elongated fixing holes 10·5 mm. dia. at 52 mm. centres is an integral part of the head.

The maximum recommended fuel-flow is 10 gal./hr.; the minimum gravity pressure head, 3 ft.; the maximum recommended feed-pump pressure 15 lb. per sq. in.; and the weight about 1·25 lb.

Further details may be obtained from the manufacturer, C.A.V. Limited, Acton, London, W.3.

Dynamic Balancing Machines

RAVA Komposition dynamic balancing machines are built in a range of 35 standard sizes for testing components weighing from about 1 oz. to 10 tons. Special-capacity machines can be supplied for specific requirements.

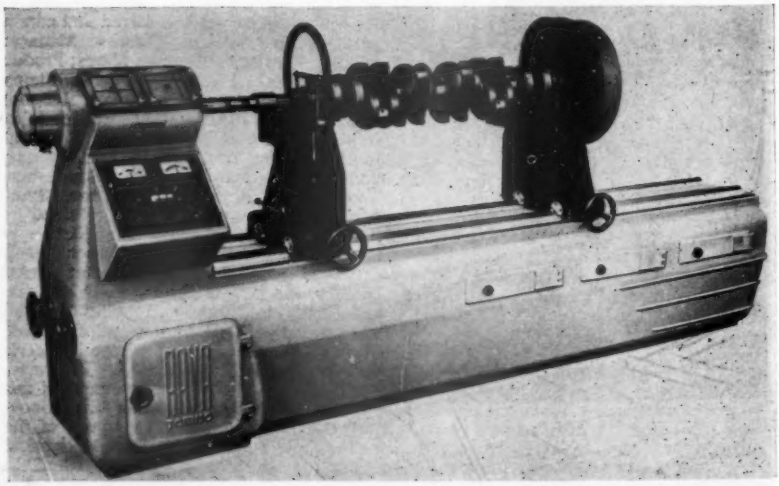
The machine illustrated is the K.300 which has a capacity for components weighing 6–660 lb. and measuring up to 40 in. dia. and 80 in. long. The workpiece, such as the diesel-engine crankshaft shown, is supported in rollers hung by vertical straps and free to oscillate like a pendulum. The rollers and the two pedestals in which they are incorporated are easily adjustable to suit varying components within the capacity limits of the machine.

The drive from the headstock to the workpiece is by means of a universal-jointed drive shaft in conjunction with adaptors to suit the component. Protective straps are incorporated on each pedestal to prevent a component from being thrown out of the machine.

Instrumentation is direct-indicating. It is claimed that once the first component of a batch has been balanced no further manipulation of the controls is necessary. An electrical pick-up is located in each pedestal and the motion of the support creates a current which is fed into a four-segment commutator rotating with the drive motor at balancing speed. Two opposite segments of the commutator are for the vertical components and the other two segments are for the horizontal components. The two pairs of components are fed separately into two d.c. meters of the zero-centre indicating type.

Two polar calculators, one for the left plane and one for the right plane, are provided above the instrument panel. Each has two knobs; one controls the vertical line and the other the horizontal line. When the meter readings are transferred to the calculator the point of intersection of the two lines determines both the amount of unbalance (from observation of concentric circle markings), and the angular location (by means of graduations on the periphery). On the main spindle of the machine there is a graduated disc to give the angular references of the unbalance in each plane.

The smaller range of machines have three balancing speeds; the larger have Ward-Leonard drives giving infinitely variable



speeds within the appropriate testing limits.

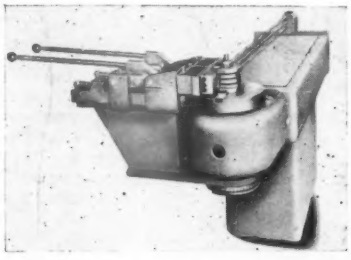
Further details may be obtained from the sole agent for Great Britain and Eire, Edward G. Herbert Limited, Atlas Works, Levenshulme, Manchester, 19.

Hotel Restaurant Accounting Centralised

ELECTRO-MECHANICAL and electronic data-processing equipment by International Computers & Tabulators Limited to be shown at the Business Efficiency Exhibition at Olympia, London, on October 3-13, will include a display of particular importance to hotel management.

This will demonstrate the automatic punched-card production of charge notes for food and refreshment supplied to patrons, by remote key-operated control from service locations to a centralised processing unit in the accounts department. The equipment is being produced for a leading London hotel.

Further details may be obtained from International Computers & Tabulators Limited, Gloucester House, 149, Park Lane, London, W.1.



Close-Radius Tube Bender

THE Staffa DB-50 draw bending machine has a capacity for bending 2 in. nominal bore heavy-grade pipe, or equivalent, to the bends described in B.S.S.1387 to a radius of 1½ x diameter. It will also bend tube of larger diameter and lighter gauge, in both ferrous and non-ferrous materials.

It is claimed to be fast, accurate, and dependable. A major development is that it enables the user initially to purchase a low-priced hand-operated basic machine to which can be added standard accessories at a later date as required. The machine frame is an electrically welded assembly of folded heavy-gauge mild-steel channels and a high-duty steel casting of ¾ in. minimum thickness; this is accurately bored and faced after welding. The standard bed length is 6 ft.

The extra equipment available includes power-operated clamps, pressure dies, mandrel withdrawal, length stops, force-feed lubrication through hollow mandrels, plane of bend indicator, automatic-cycle control, and multiple angle-of-bend set-up, all of which can be installed easily by the user.

Further details may be obtained from the manufacturer, Chamberlain Industries Limited, Staff Works, Argall Avenue, Leyton, London, E.10.

Heating Laminated Springs

PRODUCTION of laminated springs at Thomas Turton & Sons Ltd., Sheffield, for locomotives and heavy transport vehicles, is being accelerated by a new technique in heating the spring steel.

Specially adapted oxy-fuel gas nozzles, supplied by British Oxygen Gases Limited, are used for the heating process before the nibs which ensure symmetrical nesting of the leaves are formed in the centre of each by hydraulic press.

The advantage compared with the old air-blown forge technique, is that the treatment is localised to the centre portions of the leaves. This means that the area of metal affected by the heat application is reduced considerably and that the properties of the surrounding material are therefore not impaired. This new technique of local heating is being used successfuly also in rolling the eyes at the ends of the spring assembly.

Further details may be obtained from British Oxygen Gases Limited, Spencer House, St. James's, London, S.W.1.

Rock-Drill

THE Silver Thirty-Three rock drill for civil engineering, mining, and quarrying has the airleg as an integral part which has enabled all controls to be grouped within easy reach of the operator's hand.

All the operating air enters the machine through a single hose and is distributed internally by controls situated in the backhead. The airleg control is of the roller-ratchet type and the main throttle also controls the flow of water to the drill bit. This grouping gives easier and quicker operation, while the built-in water control automatically ensures a flow of water immediately drilling starts.

The drill has a 3 in. bore and 1 15/16 in. stroke with a shank length of 4½ in. and the airleg has a feed length of 58 in. The total weight is 105 lb.

Further details may be obtained from the manufacturer, Holman Bros. Ltd., Camborne, Cornwall.

Six-Spindle Portable Drill

THE N.C.G.-Obear portable drilling machine can bore six fishbolt holes simultaneously when operated by one man. This is particularly useful if rails need to be cropped *in situ* for the purpose of restoring fatigued joints.

The unit is mounted on flanged wheels for transportation along the track which requires attention. It is powered by a 24-h.p. four-stroke petrol engine and has roller-chain power transmission. The six drill bits are automatically fed at a rate of ·008 in. for each bit revolution. Bolt-hole spacings can be varied to suit different rail-end drilling specifications, and the drill heads can be raised to suit requirements or clearances. This version can be converted easily to a four-hole drill.

Reinforced, 6-in. channel frame construction is used throughout. The weight is 2,300 lb. and dimensions are: height, 34 in.; length, 108 in.; width, 36 in. A three-bit version, designed for general track maintenance purposes, also is available.

Further details may be obtained from the National Cylinder Gas Division of the Chemetron Corporation, 840, North Michigan Avenue, Chicago 11, Illinois, U.S.A.

Lamp Price Reductions

FLUORESCENT lamps supplied by Philips Electrical Limited and by the Stella Lamp Co. Ltd. have been reduced in price as a result of improved production efficiency for the types in greatest demand.

Electric Lifting Magnets

WITTON-KRAMER circular electric lifting magnets for heavy duty as in foundry yards and works sidings are being made in two additional sizes, namely 30 in. and 80 in. dia. The range available now totals 17 sizes from 9 to 80 in. dia.

Shells are high-permeability steel castings machined inside to accommodate the coil, centre pole, and outer shoe. Bumping plates are of brass for sizes up to 20 in. and manganese-steel for the remainder. Non-inductive resistances are incorporated in the control gear. Terminal boxes are designed to accommodate a non-linear resistor at extra charge to ensure protection of the windings against any inductive rise in voltage caused by a broken supply cable. All bolt heads and nuts are protected against damage under working conditions.

Further details may be obtained from the General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2.

French Winter Train Services

Several accelerations will take effect in the winter timetables of the French National Railways, operative from October 2. The northbound "Phocéen" (Marseilles–Paris) first class only with sleeping cars and *couchettes*, will have no publicly booked stop over the 461 miles from Avignon to Paris, and will be accelerated 30 min., leaving Marseilles at 10.30 instead of 10 p.m., and reaching Paris Lyon at 7.50 a.m. as now.

The 4.15 p.m. from Ventimiglia to Paris is to start at 5.25 p.m., and to be combined at Dijon with the "Lombardy Express" from Milan, arriving in Paris at 8.26 a.m., a deceleration of 21 min.; but the 8.47 p.m. from Marseilles is to start at 9.35 p.m. and by omission of a number of intermediate calls will be speeded up by 37 min. A new evening service from Chambéry to Paris is to be provided by a railcar leaving Chambéry at 5.10 p.m., connecting at Lyons with the northbound "Mistral" and giving a Paris arrival at 10.51 p.m.

In the South-Western Region a 25 min. acceleration of the 10.50 p.m. from Paris Austerlitz will bring that train into Bordeaux by 6.30 a.m., providing a new railcar connection to Toulouse with an arrival at 9.30 a.m. The Western Region is providing a 4-hr. service between Paris St. Lazare and Cherbourg three times a week in each direction by extending the 8.10 p.m. first class railcar from Caen to Cherbourg, with an arrival at 12.8 a.m.; eastbound, the reverse direction the 12 noon from Caen will leave Cherbourg at 10.25 a.m., with a Paris arrival at 2.26 p.m.

In the Northern Region a new fast railcar service is to be provided from Arras to Dunkirk in connection with the 7.33 p.m. express from Paris Nord, reaching Dunkirk at 11.4 p.m., an acceleration of 46 min. This will be convenient for passengers for the ferry steamer to Dover who are not travelling by the through sleeping car train, and will thus be saved the necessity to change from train to steamer at 1.40 a.m.

Staff & Labour Matters

Railway Shopmen's Wages

Both the N.U.R. and C.S.E.U. have rejected the British Transport Commission offer to increase the rates of pay of railway workshop staff by a further 3 per cent with effect from January 11, 1960.

The unions wish the increase to be paid from January 4, 1960, which was the date from which increases were granted to staff covered by the Guillebaud Inquiry, which did not cover shopmen. They are dissatisfied moreover with the amount of the offer, which will give increases slightly more than 8 per cent, taking into account the 5 per cent increase already granted from January 11. The unions claim that as regards craftsmen the proposed rates compare unfavourably with those paid in outside industry.

At an unofficial meeting of delegates from railway workshops held in London on September 17, it was decided to take action if the employees' side of the Railway Shopmen's National Council accepted the Commission offer when talks were resumed with Sir Brian Robertson, Chairman of the B.T.C. on September 21. The unofficial meeting agreed that the offer should be rejected irrespective of whether it was back-dated to January 11 or January 4; it desired an increase of 8 per cent in addition to the 5 per cent already granted from January 11, 1960. A minority resolution proposing a minimum of £13 a week for craftsmen was not carried. The meeting specified a time limit for the conclusion of talks between the unions and the Commission.

Shortage of L.T.E. Bus Crews

A meeting was held on September 16 between representatives of London Transport Executive and the Negotiating Committee of the Transport & General Workers' Union. At the meeting on September 13, the Committee was informed that L.T.E. still believed that the best way of dealing with the staff position and to improve the quality of service offered to the public was to introduce an incentive bonus scheme for drivers and conductors. The Executive had examined the scheme discussed earlier in the year and had made certain improvements to meet points previously raised on the scheme. It also informed the Negotiating Committee that it was prepared to make changes in the existing allowances for duties starting early in the morning or finishing late in the evening; to improve the scale of payment for scheduled overtime on Saturdays; and to ease working conditions on Sundays.

At the meeting on September 16 the Negotiating Committee informed the Executive of its views and after further discussion agreed to report the L.T.E. proposals to a delegate conference of the Union on September 19. The conference referred the matter to the garages concerned.

Incentive Bonus Scheme for Busmen

In the scheme proposed there would be initial payments of 10s. 6d. or 9s. 6d. a week (according to the class of garage) to central road service drivers and conductors *plus* a safety bonus of 2s. a week to drivers for each five years of service without blameworthy driving accidents and a bonus to conductors for freedom from passenger accidents. Initial payments of 9s. 0d. a week *plus* the "safety" payments would be made to country bus and Green Line drivers and conductors.

London Transport Executive told the T.G.W.U. Negotiating Committee that it would be prepared to regard the initial payments proposed as a minima below which the bonus would not fall as long as normal working was maintained.

L.T.E. also has proposed increased payments to busmen for duties starting before 6 a.m. or finishing after 10 p.m. and the introduction of shorter maximum hours of duty on Sunday and improved scheduled overtime rates for Saturday working.

Manchester-Crewe Electrification Inaugurated

(*See last week's issue*)

Mr. Ernest Marples, Minister of Transport, performing the opening ceremony at Manchester Piccadilly: (seated) left to right: Lord Rusholme; Alderman A. Donovan, Lord Mayor of Manchester; Sir Brian Robertson; Sir Reginald Wilson; and Mr. David Blee

QUALITY CONTROL CONFERENCE.—Over 600 delegates representing firms and organisations from 17 countries attended the conference, organised by the British Productivity Council at Church House, London, S.W.1, earlier this month, of the European Organisation for Quality Control. The conference was opened by Mr. Frank Erroll, Minister of State, Board of Trade. Sir Bertram Waring, Deputy Chairman of the British Productivity Council, stated at the opening ceremony that quality control had a special significance for the Council because it was one of the major factors for the achievement of high productivity. Pride in achievement, he added, was not always obvious in the case of semi-skilled or unskilled workers employed as machinists or assemblers of articles made in large numbers. Their satisfaction came from the joint endeavours of a working group—provided the group was well led and that, in consequence, there was a good team spirit. Bad quality and rejects resulted in criticism, in arguments and in bad tempers, all of which interfered with the rhythm of effort.

Contracts and Tenders

Electric locomotives for the German Federal Railway

The German Federal Railway has placed contracts to the value of 390 million marks (£33,160,000) for 342 electric locomotives, which are to be delivered between the middle of next year and 1964. The locomotives are to be built by Krauss-Maffai, Henschel, and Krupp, and the power units by Siemens, A.E.G., and Brown-Boveri.

The Crown Agents has placed an order with Charles Roberts & Co. Ltd., for two bogie well wagons for Sierra Leone Government Railway.

Powell Duffryn Engineering Co. Ltd. has received an order from the British Transport Commission for 40 23-ton twin-silo wagons.

Preformed Line Products (Great Britain) Limited has received an order from British Insulated Callender's Construction Co. Ltd. for 34,800 sets of preformed aluminium alloy armour rods for delivery to Pakistan.

British Railways, Eastern Region, has placed the following contracts:—

Hutton (Builders) Limited: contructions of a single-storey building on the down side at Colchester Station

R. G. Carter Limited: demolition of existing buildings and construction of new buildings for passenger and staff accommodation at Yarmouth Vauxhall Station

Kirk & Kirk Limited: reconstruction work at Rainham Station

T. & H. Hopkin Limited: alterations and improvements to 57 houses in Ellis Street, Brinsworth

C. Coleshaw: removal of redundant assets and other works at Blyton, Walkeringham, Beckingham, Stu.ton, Ranskill, Crow Park, and Carlton-on-Trent Stations

The Fairfield Shipbuilding & Engineering Co. Ltd.: supply and delivery of steelwork for the reconstruction of Harringay Viaduct, bridge No. 23, over main, goods and suburban lines, between Harringay West and Hornsey

Drake & Gorham (Contractors) Limited: supply, delivery and erection of electrical installation at Chelmsford Station

Holland & Hannen and Cubitts (Great Britain) Limited: improvements at Westcliff-on-Sea Station

Concrete Proofing Co. Ltd.: repairs to reinforced concrete sub-structures at Harwich and Parkeston Quay

George Simpson (London) Limited: reconstruction of goods shed roof at Maldon East goods depot

Reliance Telephone Co. Ltd.: supply and installation of a 100-line private automatic branch telephone exchange at Colchester

Kirk & Kirk Limited: demolition of existing loading dock, store building and oil store and the construction of new workshop and messroom building and cycle shed at Tilbury Riverside Station.

British Railways, North Eastern Region, has placed the following contracts:

The Cleveland Bridge & Engineering Co. Ltd.: renewal and widening of bridge No. 106, Salters Lane North, Darlington

James R. Rutherford & Sons Ltd.: staff accommodation and amenities at Greensfield Motive Power Depot, Gateshead

Drummond-Asquith Limited: supply of a Dawson axlebox washing machine for Springhead Wagon Works, Hull

Hergarth & Company: JCB.4 self mobile excavator for the Chief Civil Engineer's department

Alfred Herbert Limited: Herbert "47V" vertical miller and equipment for the Locomotive Carriage & Wagon development unit at Stooperdale, Darlington

Newall Group Sales Limited and the Societe Genevoise Limited: provision of machine tools and equipment for the Locomotive Carriage & Wagon development unit, Stooperdale, Darlington

Ransome Sims & Jeffries Limited: one-ton battery operated mobile crane and ancillary equipment for Bradford Valley Goods Depot

Walter Thompson Limited: improvements to houses Nos. 1-18 inclusive, Railway Cottages, Thirsk

F. & J. Watkinson: repairs to bridges Nos. 41 and 43 at Marsh Lane, Leeds

E. Davis (Fixers) Limited: alterations and strengthening of the superstructure of bridge No. 39, Cod Beck, between Sessay and Thirsk, on the main line north of York

Steels Engineering Installations Limited: lubricating oil and compressed air facilities at Greensfield Motive Power Depot, Gateshead

Tarslag Limited: demolition and reconstruction of bridge No. 64, at Marske, on the Middlesbrough-Saltburn line

N. W. Dunn & Co. Ltd.: construction of roadways at Crofton Permanent Way Depot, near Wakefield.

G. Dougill & Sons Ltd.: construction of repair pits and associated works at the new diesel erecting shop at North Road Works, Darlington

Thos. Storey (Engineers) Limited: provision of timber ribands and chesses, and hire of Bailey bridges required in connection with the repair of bridge No. 229, Bog Lane, on the East Coast main line north of York

The Brightside Heating & Engineering Co. Ltd.: heating and hot water installation and associated builders' work at Clavering House, Newcastle

W. Richardson & Co. Ltd.: provision of centralised heating, water and ventilation systems for the District Engineer's Offices at Darlington

Cawood Wharton & Co. Ltd.: demolition of earthworks, drainage, roadworks, and so on, required in connection with the modernisation of the forwarding shed at Bradford

Wesley H. Oliver Limited: improvements to 25 railway houses in Wenlock Road, South Shields

The Cleveland Bridge & Engineering Co. Ltd.: part reconstruction and widening of bridges Nos. 36 and 36A at Apperley Bridge and Rawdon

Leslie Hartridge Limited: provision of heavy-duty test equipment for fuel pumps, injectors, and so on, for maintenance of main-line diesel locomotives at North Road Works, Darlington

The Paterson Engineering Co. Ltd.: provision of a water treatment plant for Heaton Motive Power Depot

F. Whittaker & Company: renewal of concrete waybeams in Nos. 1 and 2 carriage washing sheds, Neville Hill, Leeds

Raines (H. & V.) Limited: installation of a hot water heating system at Bradford Valley Goods Depot

J. W. Mitchell & Son Ltd.: construction of a stacking ground and roadway at Liversedge Spen Goods Depot.

The Export Services Branch, Board of Trade, has received calls for tenders as follow :—

From Western Australia:

Design, manufacture, supply, and delivery of two trains in complete operational condition, except that the Commission reserves the right to provide the necessary bogies.

The issuing authority is the Western Australian Government Tender Board, 74 Murray Street, Perth, to whom bids should be sent. The tender No. is 660A, 1960. Tender documents are also available at the Office of the Agent General for Western Australia in London, 115 Strand, W.C.2. The closing date is December 8, 1960. The Board of Trade reference is ESB/24131/60.

From India:

2,300 fittings for cross span cable, for register arm, for tangent track B.I. type or similar to B.B. & C.I. Rly. C.E.E.'s drg. No. S.283R, S.752 and S.753 (D.G.S. & D. No. 16209 to 16211).

The issuing authority is the Director of Supplies & Disposals (Purchase Branch), Graham Road, Ballard Estate, Bombay, to whom bids should be sent. The tender No. is BOM/E1/4055-L. The closing date is October 5, 1960. The Board of Trade reference is ESB/24161/60.

29 items of re-railing equipment, including compressor unit, pumps, re-railing bridges, roller carriages, bogie suspensions, hoses, jacks, lighting plant and hoisting device.

The issuing authority is the Director General of Supplies & Disposals, Shahjahan Road, New Delhi, to whom bids should be sent. The tender No. is P/WP7/1; 15067-L/1. The closing date is October 4, 1960. The Board of Trade reference is ESB/24124/60.

5 self-indicating self-contained twin combined type railway weighbridge, approx. 60·96 *tonnes* capacity, for weighing stationary metre gauge wagons.

The issuing authority is the Director-General of Supplies & Disposals, Shahjahan Road, New Delhi, to whom bids should be sent. The tender No. is P/SR8/15058-L/III. The closing date is October 4, 1960. The Board of Trade reference is ESB/24122/60.

From South Africa:

1 electric-motor driven, heavy-duty, horizontal universal milling machine, as called for in the mechanical and electrical specifications

1 set of electric lighting equipment as called for in the electrical specification

1 fully dimensioned velograph or litho print as called for in mechanical specification.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. G.8406 Milling Machine," should be addressed to Chairman of the Tender Board, P.O. Box 7784, Johannesburg. The closing date is November 11, 1960. Local representation is essential. The Board of Trade reference is ESB/24144/60.

From Portuguese East Africa:

120 pairs of fishplates, fibre, or equivalent, for insulation of rail joints.

The issuing authority is Ports, Railways & Transport Department, Lourenço Marques, to whom bids should be sent. The tender

No. is 255/60. Drawings are obtainable from the Railway Warehouse at Lourenço Marques through the local agents of United Kingdom firms interested. The closing date is October 28, 1960. The Board of Trade reference is ESB/24479/60.

From Pakistan:

40 sets of switches complete with all fittings including optional parts round spikes, and stretcher bars. for 90-lb. "R" 1 in 12 crossing as per drg. No. TA5045

40 sets of crossing complete with all fittings including optional parts, round spikes for 90-lb. "R" 1 in 12 as per drg. No. TA5039 alt. 8

18 sets of switches complete with all fittings including optional parts, round spikes, and stretcher bars for 90-lb. "R" 1 in 8½ crossing as per drg. No. TA5063 alt. 1

18 sets of crossing complete with all fittings including optional parts, round spikes for 90-lb. "R" 1 in 8½ as per drg. No. TA5042 alt. 11

2 sets of diamond crossing with double slip complete with all fittings including optional parts, round spikes, and stretcher bars for 90-lb. "R" 1 in 8½ as per drg. No. TA5042 alt. 11, TA5079 alt. 3, and TA5078 alt. 9

2 sets of diamond crossing with single slip complete with all fittings including optional parts round spikes for 90-lb. "R" 1 in 8½ as per drg. No. TA5042 alt. 11 and TA5077 alt. 11

22 sets of switches complete with all fittings including optional parts, round spikes, and stretcher bars for 60-lb. "R" 1 in 12 crossing as per drg. No. TA5053 alt. 8

22 sets of crossing complete with all fittings including optional parts, round spikes for 60-lb. "R" 1 in 12 as per drg. No. TA5047 alt. 8.

The issuing authority is the Stores Department of the Eastern Bengal Railway. The tender No. is PT/D1/28/60. The closing date is October 10, 1960. The Board of Trade reference is ESB/24630/60. No further information about this call for tenders is available from the Board of Trade.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

The Director General, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tenders for the supply of rubber-bonded metal buffers and stops; and axle-holding rubber linings. The closing date is October 13, 1960. For further details see the official notice on page 380.

INDUSTRIAL METALS EXHIBITION.—The Mond Nickel Co. Ltd. is presenting an exhibition at the South Wales Institute of Engineers, Cardiff, from November 1 to 4, which will be of interest to all concerned with engineering problems involving the use of metals. There will be lectures and film shows. The main emphasis will be on the properties of nickel containing materials and the platinum metals. For convenience the exhibits, displays and demonstrations will be divided into seven sections relating to the properties of metals at high, normal and sub-zero temperatures; metals versus corrosion; metals for surface protection; metals with special magnetic, expansion or chemical properties; methods of fabrication. Another large section will feature nickel and chromium plating to the new British Standard.

Notes and News

Lines Breached by Floods in Northern Italy.—Sections of the Italian State Railways in the Bolzano district in the South Tyrol are reported to have been breached by floods after heavy rain last weekend.

Gloucester Railway Carriage & Wagon Dividend.—After a reduction in the interim payment from 6d. to 4d. per 10s. share, the Gloucester Railway Carriage & Wagon Co. Ltd. is reducing the final dividend by 4d. to 8d. a share for the year ended May 31, 1960.

Closure of West Tinsley Goods Depot.—The Eastern Region, British Railways, states that West Tinsley Goods Depot, between Brightside (Sheffield) and Treeton, will be closed from October 3. A collection and delivery service for freight sundries traffic will continue to be available from the main Sheffield stations. Freight in full wagon-loads will be dealt with at Attercliffe, and Broughton Lane Stations.

Railway Benevolent Institution.—At a meeting on September 19 the Board of the Railway Benevolent Institution granted annuities to nine widows and nine members involving an additional liability of £418 per annum; 201 gratuities were also granted, amounting to £1,940, to meet cases of immediate necessity. Grants made from the Casualty Fund during the months of July and August amounted to £2,815.

Hymatic Engineering Co. Ltd. at the Public Works & Municipal Services Exhibition.—A wide range of Hymatic-Hydrovane mobile and portable compressors, designed to meet the needs of local authorities, public utilities and speciality contractors, will be shown at the Public Works & Municipal Services Exhibition, to be held at Olympia from November 14 to 19. These include the "98P100" which can power a full-size concrete breaker or contractor's tools such as sump pumps, pneumatic picks, clay and rotary drills.

Parallel Running of Western Region Diesel Pullman Expresses.—The 7 a.m. from Wolverhampton, "Birmingham Pullman," and 7.45 a.m. from Bristol, "Bristol Pullman," diesel expresses of the Western Region, British Railways, both are due Paddington at 9.35 a.m. On September 12, the first day of the new services, both trains arrived one min. early. The illustration shows them running on parallel tracks into Paddington.

Rail-and-Road Vehicles for Rhodesia Railways.—Introduction of combined rail-and-road goods vehicles is reported to be under consideration by Rhodesia Railways. Use of light helicopters also is being examined. They would be used for maintenance inspection of C.T.C. apparatus.

Newton, Chambers Interim Dividend.—The interim ordinary dividend of Newton, Chambers & Co. Ltd. for 1960 is to be 8 per cent. The company proposes to make a one-for-eight rights issue, details of which are to be announced shortly. It is proposed to increase the authorised capital from £3,000,000 to £3,500,000 and to subdivide the £1 ordinary shares into units of 5s. each. From results to date it is expected that the board will recommend a dividend of 20 per cent for 1960.

Slow Rate of Station Closures.—Concern over the rate at which small country stations were being closed was expressed at a recent meeting of the East Midland Area Transport Users' Consultative Committee. The committee was examining British Railways case for closing East Langton Station, on the London Midland Region main line between Market Harborough and Leicester. Traffic was stated to average one person per train. It was decided to put the matter before the full meeting on November 1, when closing of rural stations as a whole is to be considered.

Apprentice Training School Opened at Leeds.—A new apprentice training school, stated to be the first of its kind in the area, has been opened at the Stanningley (Leeds) works of George Cohen, Sons & Co. Ltd. The plant and machinery handled in the company's re-conditioning shops covers power, hydraulic and process plant besides machine tools, which ensures for the company's apprentices an exceptionally wide training. The school increases the works' capacity for apprentice training from 25 to 50 apprentices at any one time. Its opening is in line with the Government plea for improved training facilities needed to absorb the increased numbers of school leavers entering industry in the next few years. Basic training is provided for apprentices before they move into the works for craft training as fitters, turners, welders, or

Up "Bristol Pullman" (left) and "Birmingham Pullman" expresses running into Paddington Station, Western Region, on September 12

electricians. Equipment includes the Colchester Student lathe, a product of the George Cohen 600 Group Limited, used for training of this kind.

U.S.A.—Guatemala Wagon Ferry.—A ferry service conveying road vehicles and railway wagons is reported to be in operation between Miami, in Florida, and Puerto Matias de Galvez in Guatemala, over 1,000 mile sea journey.

Increased Aluminium Corporation Dividend.—For the year ended July 31, Aluminium Corporation Limited, controlled by the British Aluminium Co. Ltd., is recommending a dividend of 22½ per cent, payable on October 28. This compares with 10 per cent plus a golden jubilee bonus of 5 per cent paid for the previous seven months. Net profits have advanced to £143,928 from £55,337, after allowing for tax of £105,000 (£52,700).

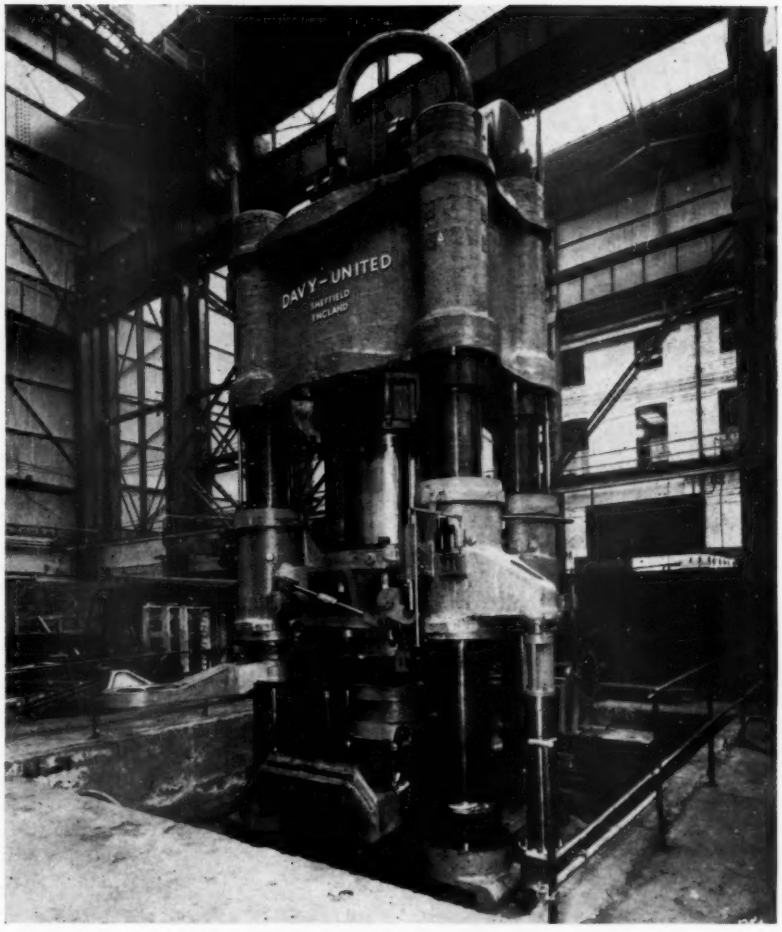
U.S.A. Railway Strike Delayed.—A strike of members of the Switchmen's Union of North America employed on 17 U.S.A. railways was due to begin last Monday. It was reported earlier this week to have been delayed to September 26, by an order of the District Court of Buffalo. The delay was intended to allow the Court to determine the validity of the statement by the railway managements that the Switchmen's Union had not complied with the Railway Labour Act.

Charles Roberts & Co. Ltd. Distribution.—No further dividend is to be paid on the ordinary capital of Charles Roberts & Co. Ltd. for the year ended March 31, 1960. Stockholders at the general meeting are to be recommended to approve the distribution to the ordinary stockholders of £69,907 10s., forming the part of the realised accretions to capital now standing to the credit of the capital reserve account, at the rate of 3d. for each ordinary stock unit of 5s.

New Poster Sites at Bank Station.—British Transport Advertising sites at Bank Station on the Waterloo-City Line, British Railways, Southern Region, have been improved in appearance for the official opening of the Travolater on September 27. At the top of the Travolater are two illuminated sites, each 8 ft. wide by 9 ft. deep, and at the foot on either side, two more special sites each 9 ft. wide by 7 ft. deep. The fifth, 5 ft. wide by 7 ft. deep, overlooks the foot of the Travolater from a dominating position behind the buffer stops. In addition, 140 glass-covered panels, 16½ in. wide by 22½ in. deep, have been installed alongside the 354-ft. long Travolater. Fitments to display 34 double crown posters in pairs one above the other have also been installed.

A.E.I. Interim Dividend.—A second interim ordinary dividend of 2½ per cent has been announced by Associated Electrical Industries Limited. The group net trading profits for the half year ended June 30, declined to £4,940,000 from £5,010,000 for the same period of 1959, after allowing for depreciation of £2,990,000 (£2,740,000), but before charging tax. The value of output rose to £101,900,000 from £95,600,000 previously. Orders received, mainly for delivery within three years, expanded to £113,300,000 from £84,900,000. Last year the second interim dividend was followed by a third interim of the same amount and a final of 7½ per cent, making 15 per cent for 1959.

Wheel Forging Press for Indian Steelworks.—The 600-ton hydraulic wheel forging press shown in the illustration was built by the Davy & United Engineering Co. Ltd., a member of ISCON, the British consortium constructing the steelworks at Durgapur, West Bengal, works. It is designed to forge steel ingots into solid railway wheel blanks, ready for rolling and finishing, in five operations taking less than 90 sec. The wheel and axle plant at Durgapur, of which this press will be the primary productive unit, is scheduled to come into service in July, 1961. Initial production is to be 45,000 carriage and wagon wheel-sets a year (two wheels and one axle per set) with provision for subsequent expansion to 75,000 wheel-sets annually in the future. This output is required to meet the Indian Railway Board carriage and wagon building programme.



Carriage and wagon wheel forging press built by the Davy & United Engineering Co. Ltd. for Durgapur Steelworks, Bengal

West Cumberland Diesel Services.—In his letter in our September 16 issue Mr. G. P. J. de Clermont stated that passengers by diesel train from Carlisle to Keswick were obliged to detrain at Penrith and wait whilst the train was shunted over to the Keswick line. Arrangements have now been made to allow passengers for Keswick to remain in the train at Penrith, if they so wish, during shunting.

L.M. Region Station Closures.—Pendlebury Station between Manchester Victoria and Atherton Central, in the London Midland Region, British Railways, is to be closed for passenger and parcels traffic from October 3. Bus services operate in the area. Parcels and passenger train merchandise will be dealt with at Swinton. Also in the London Midland Region, Formby Goods Depot between Liverpool Exchange and Southport will be closed on October 3 for all goods traffic except that dealt with through private sidings. Facilities for dealing with horse-box and prize cattle van traffic by passenger train will also be withdrawn. Alternative arrangements have to be made for dealing with freight traffic at Southport Kensington Road or Hightown and horse boxes and prize cattle vans by passenger train at Marsh Lane and Strand Road or Southport Chapel Street. Edmond Thorpe & Wymondham Goods Depot, between Saxby and South Witham, will be closed for all traffic from the same date; traffic will be dealt with at Melton Mowbray Town.

Silentbloc Profit Increased.—Silentbloc Limited, is maintaining its dividend at 6d. per 2s. share, the minimum rate forecast, on the capital as increased by a one-for-six rights issue, with a final of 3d. per share. A further rights issue of £1,100,000 shares on a two-for-seven basis at 3s. a share is proposed, and the directors expect a maintained dividend for the year to May 31, 1961, on the enlarged capital. The group net profit for 1959-60 increased from £149,799 to £206,804, after tax of £190,619, against £156,638.

Associated British Engineering Group Trading Surplus.—A consolidated trading surplus of £229,000 is announced by Associated

British Engineering for the year ended March 31, 1960, compared with a deficit of £11,406 for the preceding 12 months. As for the previous year, no dividend is recommended on the £1,100,000 ordinary capital. Group net profits total £54,779 after a tax charge of £52,188. A net loss of £98,823 was incurred in the previous year, after taking into account a tax credit of £100,702.

Railway Stock Market

Sentiment in stock markets has been affected by the belief that, despite City hopes, the Chancellor of the Exchequer will not ease the credit squeeze or reduce the bank rate until there is improvement in export trade. Share prices accordingly have remained reactionary. Foreign rails have moved narrowly. Buyers generally have shown caution, partly of fears that Wall Street markets may be affected by developments in international affairs.

Antofagasta ordinary stock, however, at 12½ was unchanged compared with a week ago, while the preference stock improved slightly from 30½ to 31: the 4 per cent perpetual debentures were 45½. Mexican Central "A" bearer debentures have kept at 57½.

Sao Paulo Railway 3s. units at 1s. 1½d. while United of Havana second income stock has been maintained at 6.

Costa Rica ordinary stock was 40, with the first debentures 94½ and the second debentures 112. Guayaquil & Quito assented bonds remained at 69½, and Chilean Northern first debentures were 55½. Brazil Railway bonds were 5⅜ and Paraguay Central prior debentures 15.

In other directions, International of Central America common shares were $25 and the preferred were quoted at $105½.

Nyasaland Railways shares kept at 9s. with the 3½ per cent debentures 45½. Midland of Western Australia second income stock has remained at 27½, and Emu Bay 4½ per cent debentures were 36½xd.

West of India Portuguese Railway capital stock has changed hands at 111½. Barsi Light Railway was quoted at 17½.

Canadian Pacifics moved closely with the trend of Wall Street, and at $40⅜ were at a new low for the year; a week ago the quotation was $41⅝. The 4 per cent preference stock, however, strengthened from 61⅜ to 62 and the 4 per cent debentures were fractionally better at 64½. White Pass shares eased from 11½ to 11¼.

Among shares of locomotive builders, engineers and kindred companies, Gloucester Wagon 10s. shares came back sharply to 12s. on the reduction in the dividend from 15 to 10 per cent, and in other directions, Charles Roberts 5s. shares receded afresh to 9s. 3d. Beyer Peacock 5s. shares at 7s. 9d. compared with 8s. 4½d. a week ago, while also reflecting the general trend in markets, Westinghouse Brake have moved back from 50s. 6d. to 49s. Birmingham Wagon were steady at 34s. 10½d. North British Locomotive changed hands around 9s. 3d. and Wagon Repairs 5s. shares were good at 18s. 3d.

Associated Electrical declined from 49s. 4½d. a week ago to 48s. 6d. on the half-yearly figures which suggest that profit margins are still narrowing, because earnings have moved somewhat lower, despite an increased volume of business. General Electric shares rose on balance from 38s. 4½d. to 39s. 9d. a result of revived talk in the market of a possible take-over bid, though this is without any confirmation, and no approach has been made to the company. English Electric were 35s. 6d. compared with 37s. a week ago at which there is an attractive yield of nearly 5⅛ per cent. Crompton Parkinson 5s. shares at 13s. 10½d. were within 3d. of the level ruling a week previously.

Vickers at 33s. 3d. have not held best prices, despite the maintained interim dividend and higher profits for the half year. Reflecting the trend of stock markets, Pressed Steel 5s. shares moved lower, and at 29s. compared with 30s. 3d. the previous week, while Dowty Group 10s. shares came back from 39s. 9d. to 38s. 7½d. Ransome & Marles 5s. shares kept steady at 27s.

Forthcoming Meetings

October 1 (*Wed.*).—Electric Railway Society, at the Fred Tallant Hall, 153, Drummond Street, London, N.W.1, at 7.15 p.m. Paper entitled "A European Survey," by Mr. G. W. Morant.

October 1 (*Sat.*).—Railway & Canal Historical Society, at the eastern section of Booking Hall, Victoria Station, London, at 2.15 p.m. Centenary of the opening of Victoria Station, conducted tour.

October 1 (*Sat.*).—Railway Correspondence & Travel Society. "Northern Heights" tour. Departure from Fenchurch Street, Station at 1.55 p.m.

October 2 (*Sun.*).—Railway Correspondence & Travel Society, North Euston Branch, rail tour.

October 3 (*Mon.*).—The Society of Engineers, at Burlington House (entrance at east end), London, W., at 5.0 p.m. Paper by Mr. W. A. Crago on "Some notes on Hovercraft," illustrated by a film.

October 4 (*Tues.*).—South Wales & Monmouthshire Railways & Docks Lecture & Debating Society (Cardiff), at the Angel Hotel, Cardiff, at 6.30 p.m. Address entitled "Hong Kong," illustrated with coloured slides.

October 5 (*Wed.*).—Railway Travel & Correspondence Society, Lancs & N. W. Branch, at B.R. Staff Assn., Carnforth, at 7.00 p.m. Paper on "British Railways Marine Services," by Mr. A. E. Willmott.

October 5 (*Wed.*).—The Newcomen Society, Annual General Meeting, at the Science Museum, South Kensington, London, S.W.7, at 5.30 p.m. Presidential Address by Mr. C. E. Lee.

October 5 (*Wed.*).—British Railways (Southern Region) Lecture & Debating Society, at the Chapter House, St. Thomas' Street, London, S.E.1. Address by Brigadier Langley on "The history & work of the railway inspectorate, Ministry of Transport."

OFFICIAL NOTICES

THE DIRECTOR GENERAL, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tenders for the supply of:

Tender Ref. No. 18011/60/*BMB*/*HAL*

"Rubber Bonded Metal Buffers and Stops; and Axle Holding Rubber Linings."

The Tender forms (with Schedule and Specifications) which are returnable on October 13, 1960, may be obtained from the above office (Co-Ordination Branch) on payment of a fee of 10s. (not refundable) for each tender.

Please quote the above reference number.

Foreign Employment

ROADMASTER

ENGINEERING GRADUATE preferred; minimum of two years engineering training essential.

Require two years varied railroad engineering service, or five years in direct charge of track crews. Will supervise 135 men maintaining 45 mile railroad, assign work, order materials, be responsible for safety, make regular detailed inspections of roadbed and all track on main line, sidings and yards, bridges, tunnels, etc. Will make engineering calculations relating to maintenance and use of structure and equipment. Must speak Spanish. Married or single candidates acceptable.

Excellent opportunity large copper company, Chile, South America. Two year contract with transportation both ways for you and family. Basic salary $525.00 to $650.00 per month depending upon age and experience of applicant.

Box 6, The Railway Gazette, 33 Tothill Street, S.W.1.

RHODESIA RAILWAYS

Vacancies for Civil Engineers

VACANCIES exist on the Permanent Staff for Civil Engineers for service in the Chief Engineer's Department of the Rhodesia Railways. Normally applicants under 30 years of age will be given preference.

Applicants under 25 years of age should possess a degree in Civil Engineering.

Applicants over 25 years of age should possess a degree in Civil Engineering and be prepared to sit Part III of the examination for Corporate Membership of the Institution of Civil Engineers within a reasonable period, or should be Corporate Members of the Institution.

Applications will also be considered from men who have passed Part I and II of the Institution examinations, for appointment to the grade of Technical Assistant until such time as they become Corporate Members and are, therefore, eligible for transfer to the Professional Grade.

The salary scale for Assistant Engineers is £1,000 to £1,800 per annum, plus a Cost of Living Allowance at present calculated on 12 per cent of the basic salary, subject to a maximum of £13 15s. 0d. per month. The commencing salary will depend upon previous experience of the applicant. The annual increments in the above scale are as follows :—

£1,500 x £100 to £1,200
£1,200 x £50 to £1,500
£1,500 x £100 to £1,800

Further, advancement to the grade of District Engineer on the salary scale of £2,000 x £100 to £2,300 per annum is possible as and when vacancies occur. Promotion to these posts is by selection.

Membership of the Contributory Pension Fund and Medical Fund is obligatory and the usual Railway privileges in respect of travelling concessions, leave, etc., will apply.

Income Tax in the Federation is not unreasonable and, at the present time, a married man with one child, earning £1,100 per annum would not be liable.

Housing is provided at a moderate rental for married engineers ; the rental payable is £7 10s. 0d. per month for Officers in receipt of a salary under £1,700 per annum, and £10 per month for Officers in receipt of higher salaries.

Full particulars with regard to age, training, qualifications and experience should be submitted, together with copies of recent testimonials, to :—

The London Agent,
Rhodesia Railways,
241, Salisbury House,
London Wall, London, E.C.2,

from whom full details regarding conditions of service may be obtained.

RHODESIA RAILWAYS

Vacancies for Signals and Communications Engineers

VACANCIES exist on the Permanent Staff for Signals and Communications Engineers for service in the Chief Engineer's Department of the Rhodesia Railways.

Preference will be given to applicants who have had previous experience in the design, installation and maintenance of modern colour light signalling and/or telecommunication systems with a Railway Administration or with a firm of equipment manufacturers.

Applicants should hold a degree in Electrical Engineering at a recognised University or be Corporate Members of the Institution of Electrical Engineers. Graduate Members of the Institution will also be considered. Successful candidates will be expected to become Corporate Members of the Institution of Railway Signal Engineers in due course.

The salary scale for Assistant Engineers is £1,000 to £1,800 per annum, plus a Cost-of-Living Allowance, at present calculated on 12% of the basic salary, subject to a maximum of £13 5s. per month. The commencing salary will depend upon previous experience of applicants. The annual increments in the above scale are as follows:—

£1,000 x £100 to £1,200
£1,200 x £50 to £1,500
£1,500 x £100 to £1,800.

Further advancement to the grade of District Signal and Communications Engineer on the salary scale £1,800 x £100 to £2,100 is possible as and when vacancies occur. Promotion to these posts is by selection. Membership of the Contributory Pension Fund and Medical Fund is obligatory and the usual Railway privileges in respect of travelling concessions, leave, etc., will apply.

Income Tax in the Federation is not unreasonable and at the present time a married man with one child earning £1,100 per annum would not be liable.

Housing is provided at a moderate rental for married Engineers; the rental payable is £7 10s. per month for Officers in receipt of a salary under £1,700 per annum, and £10 per month for Officers in receipt of higher salaries.

Full particulars with regard to age, training, qualifications and experience should be submitted, together with copies of recent testimonials to:—

The London Agent,
Rhodesia Railways,
241, Salisbury House,
London Wall, London, E.C.2.

from whom full details regarding conditions of service may be obtained.